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Editorial Notes

This Week at Bournemouth

A VERY full and interesting programme lies before the delegates to the Annual Conference of the Association of Public Lighting Engineers which opened at Bournemouth on Monday, and once again the Gas Industry has ably demonstrated the value of co-operative effort and the strides that have been made in public lighting by gas during the past twelve months. We would, at the outset, congratulate Mr. C. I. Winstone, the retiring President, on a most successful year—a year which has been outstanding from the viewpoint of increasing interest and activity in public lighting matters generally, not least of which have been the recommendations contained in the Ministry of Transport's Interim and Final Reports.

On the gas side the pages of the "JOURNAL" have provided a record of continued progress and growing recognition by local authorities of the undoubted merits of gas lighting. We have referred to many new long-term contracts and all-round improvements of existing installations. We have had the publication of a valuable booklet by the British Commercial Gas Association on how to comply with the recommendations of the Ministry of Transport Report. We have referred to the continued work of the Joint Lighting Committee of The Institution of Gas Engineers, which has met regularly throughout the year to examine the initiation of research into problems relating to gas lighting, with particular reference to increasing the efficiency of gas burners, mantles, and controls. And we have seen a further co-ordination of effort on the part of lighting members of the Society of British Gas Industries to bring about a greater measure of appreciation and confidence in the work of the manufacturers. This has culminated in an increased representation of that section on the Joint Lighting Committee. That, in brief, is the backing which the Industry has behind it at the Conference at Bournemouth this week—which should stimulate a feeling of confidence that, if full use is made of the resources available within the Industry, the public lighting load can be maintained and considerably extended.

Overcoming Prejudices

THERE are still, however, a number of prejudices to be overcome if we are to advance with that full measure of confidence that will lead to ultimate success—and these can be largely overcome by a proper appreciation of the facts. In the first place, the recent activities in connexion with Air Raid Precautions have led to the assertion that gas installations are unsuitable because of their inability to be completely and positively extinguished at a moment's notice in the event of air attack. But this argument is entirely offset by the recent official pronouncement from the Home Office that in any future hostilities there will be no public lighting of any kind. So the question of rapid extinguishing does not arise. Objection has been raised on the score of the likelihood of fire as a result of traffic collision with lamp standards and bollards. But a safety device has already been perfected which automatically cuts off the gas supply in such a contingency. Then we have the objections of the financial side, who observe simply and succinctly that gas street lighting does not pay. Be this as it may, even if there is no great monetary return, we are talking in terms of prestige, not profit only, when we consider the lighting of our public highways. And while the off-peak load is of less significance to us than it is to our principal competitor, it cannot be entirely overlooked by the wise gas engineer who has in mind the levelling up of his output over the twenty-four hours.

Having satisfactorily eliminated all these objections, there is still no room for complacency. We must go out after the public lighting load with all the keenness we display in obtaining others, and to this end we must make ourselves *au fait* with the latest developments in lighting practice. With this in mind, it is well to keep in touch with the activities of the Lighting Section of the S.B.G.I., whose valuable research work on behalf of the Industry is exemplified in their exhibits at Bournemouth. These displays offer proof that they at any rate are not standing still, and it is up to the Industry to give the fullest support to this co-operative effort. Last year at

Folkestone we saw practical demonstrations of gas installations in action. This year at Bournemouth we are enabled to examine in detail the various fittings and accessories displayed and judge the craftsmanship and general efficiency of the units. A vast amount of work is going on behind the scenes, both on the research side and in the direction of publicity, as the Bournemouth Conference of the A.P.L.E. amply testifies.

The M.o.T. Report

THE Paper by Mr. J. F. Colquhoun on the M.o.T. Report was a most interesting survey. The Author referred to the criticisms which have been levelled against the Report, among them being the assertion that the Report fails in that it does not evaluate street lighting installations, because it does not provide a measuring rod by which installations can be assessed with precision. But there was nothing in the terms of reference of the Committee about the provision of yardsticks; and the various editions of the British Standard Specification have never set out to be infallible measures of the merits of installations. The last Specification, which gives the test point illumination for the various classes of lighting makes it clear that "these classes are only used for reference purposes in this Specification, and do not necessarily represent the relative merits of the installations." We now await a new Standard Specification which will take account of the recommendations of the M.o.T. Committee, and it will be recalled that the Report stated that test-point illumination values as a measure of the efficacy of any scheme are no longer desirable —a matter which the Gas Industry has for long emphasized. Lighting installations should be assessed not by the amount of illumination falling on a road, but in the visibility it affords; and in this connexion though, of course, good visibility cannot be achieved unless the quantity of light falling upon a road and other essential backgrounds exceeds a certain minimum, visibility does not increase *pro rata* to lumen output.

It will be remembered that the M.o.T. Committee hold the view that satisfactory maintenance is no less important than correct design. In his Paper Mr. Colquhoun stated quite rightly that all light sources do not deteriorate uniformly over their effective life, and at the same rate of deterioration, one source compared with another. "Some time must elapse," he said, "between the bringing of the installation into use and the completion of what one might call the initial illumination tests, and during that time the light output of the lanterns is falling, and falling more rapidly with some sources than with others, and more rapidly than will apply later on in their life." Now there is no doubt that in regard to maintenance of luminous output gas has everything in its favour, and local authorities should be impressed with the fact. With adequate maintenance which in practice proves quite economical the luminous output of gas is practically constant—so much so that many gas undertakings undertake to maintain the lighting efficiency of an installation within 25% of the initial value, and recently have accepted a contract obligation on a basis of 20% variation. And as for the actual light sources, the mantles, these are relatively inexpensive to replace —their renewal, when necessary, is economic. Moreover, they show no marked falling off in light output over the whole of their working life. There is, too, another aspect of the maintenance question. The daylight appearance of street lighting equipment should be kept in mind. "In my view," said Mr. Colquhoun, "lanterns should be cleaned sufficiently often to ensure that they present a good daylight appearance irrespective altogether of the absorption of light through soiling and the consequent diminution of their effectiveness as lighting agents." With this view we agree, in spite of the increased mounting height of light sources, which gives added importance to the pleasing design of lamp columns, their appropriateness to the surroundings. In this regard the use of neat and elegant concrete columns has done much to add to the daylight attractiveness of modern thoroughfares.

Central Suspension of Light Sources

THIS brings us to the question of the central suspension of light sources. In certain circumstances central suspension may be the only solution to effective illumination of the road; we are thinking particularly of roads lined by trees, which, with sidewalk siting of lamps, would interfere dangerously with safe visibility. Our experience of driving tells us that in the daytime the "L" driver hugs the crown of the road and that at night-time the "ordinary" driver, if the lighting is centrally suspended, tends to hug the crown of the road to avoid accident due to an ill-defined, confusing, or light-obliterated kerb. Unless the lumen output of centrally suspended light sources is more than adequate for the requirements of roads in general, then, we think, central suspension is, to say the least, a blemish of discretion. Still another aspect of centrally suspended lamps—in daytime a hideous labyrinth of wires crosses the vision of the pedestrian or the rider in an internal-combustion motor 'bus. The Gas Industry, and many who have had no direct connexion with the Industry, have from time to time put forward the opinion that cable-carrying pylons despoil the countryside. We think they do, and we hope for underground cables in the vicinity of Cockermouth and many other desirable places. But what about the town-dweller? Is he to be compelled to move about underneath a mesh of cable, some for the movement of electrically propelled vehicles and some for the suspension of gas lamps?

We cannot think that the Gas Industry, unless needs compel, will desire to indulge in the central suspension of lamps, which is not to say that centrally positioned lamps in dual carriageways are not desirable. They may well be; and this was brought out in the Paper at the A.P.L.E. Conference by Mr. Colquhoun. In the M.o.T. Report there was a tentative recommendation that dual carriageways should be lighted as separate traffic routes, that if this were done, then satisfactory results would be obtained. In his Paper Mr. Colquhoun remarked that the memorandum on the lay-out and construction of roads states that the separation of dual carriageways should be effected by a reservation of the greatest width practicable and that endeavour should be made to secure a width of not less than 6 ft. between dual carriageways of 30 ft. There are, however, already in existence many dual carriageways with reservations less than 6 ft. wide, and the Report says that if the reservation is narrow it may be desirable to employ a single row of units mounted centrally along the reservation forming, in conjunction with the sources along the outer kerbs, a staggered arrangement on each carriageway. Now Mr. Colquhoun's views—and we think they are sound—are that where the carriageways are more than 30 ft. in width, or where the central reservation is more than, say, 10 ft. in width, each carriageway should be lighted independently as a separate traffic route; and that where the

carriageway is 30 ft. or less in width, and where the central reservation may be considered to be contributing to the lighting of both carriageways, it is in keeping with the spirit of the Report if the full light output of these lanterns in the central reservation is included for both carriageways in the calculation for lumens per 100 linear ft. Here is a quotation from the Paper: "I do know that in some cases dual carriageways are being lighted by too many lamps. I would not say that these are over-lighted, but the multiplicity of light sources results in confusion in the mind of the driver as to the direction of the carriageway. I suggest, therefore, that where at all possible, one lamp in the central reservation should give service to both carriageways, and I think this could quite well be done if the central reservation is not more than 10 ft. wide, and if the dual carriageways themselves are of normal width—*i.e.*, about 30 ft."

On the other points dealt with by Mr. Colquhoun, such as spacing and overhang and siting of lamps, lighting at curves and bends, glare and the effect of the nature and the condition of the road surface, we have already commented in these columns when the M.o.T. Report was issued; but we would emphasize the significance of the recommendation that consideration should be given to the responsibility for the lighting of classified roads being confined to large administrative units, the importance of the suggestion that grants should be provided from national funds towards the cost of lighting traffic routes upon which public lighting may be regarded as necessary, and, finally, that the local authority concerned with street lighting should be advised by an engineer competent to deal with the problems which arise.

A.R.P. and Lighting

EARLY this year, through the courtesy of Mr. James Mitchell, the City Gas Engineer and Manager, the "JOURNAL" was given special facilities as observer in a great experimental black-out at Leicester, and our impressions were recorded in the "JOURNAL" of Feb. 2. The article will, we feel sure, have proved very helpful to many gas undertakings, for Leicester has been in the van in regard to air raid precautions. At the A.P.L.E. Conference Mr. Thomas Wilkie, Public Lighting Engineer at Leicester, gave a Paper in which he expressed his personal opinions as to what would prove effective public lighting in the event of an air raid. The object of the Paper was to set down reasons—and they are very interesting reasons—why in such an event a state of continuous darkness could not be looked upon with equanimity. A state of darkness was accepted in the War as inevitable, but, as Mr. Wilkie pointed out, we have travelled far, scientifically, since then and means are now at hand for reducing the discomfort of protracted periods of darkness. Mr. Wilkie's theme was that the provision of lighting during non-raid periods would make a considerable contribution towards reducing the rigours of war.

Having described the arrangements made for lighting in the Leicester black-out, Mr. Wilkie suggested that the experiment could be challenged on four grounds—that every driver was thoroughly acquainted with the test route, that he was aware of the various road markings, that there were no pedestrians using the streets under test—a matter of the first importance—and that he was accompanied by an observer who also assisted in navigation. To the Author's mind the lighting aspect in connexion with Home Defence has not been given the consideration it merits or the same consideration which has been given to other aspects. The Home Office Circular of Feb. 14 last, indicating the measure of lighting restrictions which will be enforced in an emergency, he argued, represents the easiest method of dealing with the subject by simply saying that there shall be no street lighting—that this, "while possibly satisfying military needs, does not pay any heed to the morale requirements of the vast civilian population. . . . The Circular indicates that no known system is good enough to be generally entrusted with the control of street lighting." Mr. Wilkie's case was that every endeavour should be made to find an acceptable system and that lighting should be allowed during normal dark hours and that when an air raid is imminent all lighting should be extinguished until the "all-clear" is given, when lighting should be restored. The purpose of air raids, said Mr. Wilkie, is either to destroy or dislocate works of national importance, or to destroy civilian morale, and in regard to the latter, target precision can be very indifferent and yet be effective. Again, many areas are more prone to raids than others, and Mr. Wilkie suggested that separate schemes of defence should be adopted for such areas. While no doubt a case could be made for continuous darkness in the east coastal areas, such drastic restrictions should not be made to apply automatically to inland and west coastal areas. Then there is the question of incendiary bombs, which will work against the safety which it is hoped to create by the imposition of drastic lighting restrictions. Referring to the method of warning civilians that an air raid is imminent, Mr. Wilkie put forward the view that the very act of darkening a city would be a useful and effective auxiliary to the sirens, but the act of re-lighting when the "all-clear" is given would be invaluable, among other things, in restoring the morale of inhabitants. Moreover, lighting of some sort would be necessary for rescue work, decontamination, and so on, and the restoration of lighting would be of great value to fire brigades and ambulances. Finally, during a prolonged period of darkness it would be difficult to control crime.

Now, as mentioned by Mr. W. Hodkinson, of the United Kingdom Gas Corporation, in a Paper at the Conference, in certain quarters an opinion has been formed that where gas is used as a source of light prompt extinction in times of emergency cannot be effected. As a matter of fact, cheap and efficient devices have been developed to effect prompt extinction in the event of any emergency. The majority of these devices incorporate a simple cut-off valve operated by either an increase or decrease in gas pressure. Provision is made for setting individual units to operate at the most suitable pressure; any difficulty with regard to different pressures at varying altitudes is readily overcome. Gas as a lighting medium will continue to hold its own on the grounds of adaptability, convenience, safety, and economy.

Our Indigenous Oil Industry

IT is a striking fact that there are oil shales in many countries of the world, some of them of huge extent, but in very few instances indeed is there any established commercial oil shale industry. There is an old-established branch of the industry at Autun, in France, and this was probably where the industry started. There is a growing industry in Esthonia, which, although only of recent growth, bids fair to become the largest in the world within a year or two. And, of course, there is our own Scottish branch of the industry, which began about 1850, and, although sadly shrunken, is still the largest in existence. The Falmouth Committee noted its existence with approval, and proposed that it should be encouraged. This industry has had a hard time in the face of competition that it was nearly powerless to meet. It was in its beginning

one of the most profitable of the mid-Victorian era, when so many fortunes were made, and the Empire was prosperous beyond the rest of the world. In 1859, however, Drake's first oil-well—discovered by accident—was completed at Titusville, Pennsylvania, and the development of petroleum as a commercial product soon caused the American oil-from-coal works of that period to close down. These works had operated upon cannel coal and oil-shale.

Soon petroleum invaded other countries and the value fell from an average of $16 a barrel in 1859 to less than $1 in 1861. The products of this cheap oil reached the British market shortly afterwards and a large proportion of the total output was sold here. By 1863 the flood of imported cheap petroleum began with a bare 4 million gallons of kerosene in 1863 to reach 120 million gallons 30 years later. Other grades of oil increased similarly. The effect was to reduce the price of burning oil to an enormous extent. During the life of Young's original patent of 1850 for "obtaining paraffine oil from bituminous coals" by slow distillation, his burning oil had been selling at 2s. 6d. to 3s. 6d. per gallon; in 1875 it was 10d., and by 1894 American importers were offering kerosene in Glasgow at 4d. per gallon, barrels free. The effect was disastrous. The cannel and oil shale distillation industries reduced costs and introduced a stream of technical improvements, but by 1913, out of the 117 works that had been established at one time or another in Scotland, only six were still in existence, the others having succumbed to unfavourable circumstances.

Actually, however, the demand had been growing, and although the smaller companies not able to move with the times had disappeared, the six large companies did very well if prosperity be judged by output—which, of course, is fallacious. The output of oil shale was 423,422 tons in 1875, 1,741,750 tons in 1885, increased steadily to 2,491,885 tons in 1905, and 3,250,000 tons in 1913, which was a peak year. Evidently there had come an early example of rationalization in that industry. The pace of technical improvement had to slow down, however, and the still decreasing prices of petroleum products, coupled with the increased output, caused a halt to expansion, so that by 1925 the output had dropped to 2,458,052 tons and 10 years later to 1,408,371 tons—less than half the peak figure. Noting these figures, which were obtained in the face of every effort by the industry to deal with the situation in the light of scientific and technical practice, the Gas Industry may well congratulate itself on the fact that the laws of thermodynamics prevent a parallel flooding of the country with cheap electricity.

The Gas Industry has always been interested in cannel coal, though the coming of the Welsbach mantle and the introduction of the therm has rendered the use of cannel unnecessary. The Paper read before The Institution of Gas Engineers by Dr. King and Mr. Jamieson will be fresh in memory, and it is interesting to note that at the recent Conference on Oil Shale and Cannel Professor Cumming and Dr. Nisbet, who are members of the Scottish Oil from Coal Committee, recorded that "since Jamieson and King have re-directed the attention of the Gas Industry to a possible and successful utilization of cannel for the production of gas as well as of oil, considerable expansion in the output of this material, at least from the Lothian coalfield, has taken place." There is the difficulty that it is by no means sure that supplies of suitable cannel can be guaranteed by the coal industry. Lenticles and ribs of cannel commonly accompany seams of coal, but even when this happens the coal owner cannot always mine his cannel for reasons connected with the organization of the industry, quotas, and so forth. When cannel occurs as a separate bed, it seldom extends over an area of more than a few square miles. Its sporadic occurrence makes it difficult to assess not only the extent of the total reserves, but also the average quality of these reserves. It is felt that the better quality cannels might well be mined with the coal and set aside for special treatment.

This special treatment might be by the Gas Industry, but in that event the gas engineer will require some assurance of supplies if he is to alter his practice to include cannel among the gas-making coals once again. The special treatment might be for the production of oil as it formerly was, but obviously a cannel-oil industry would be subject to the same conditions as the shale-oil industry, and could only exist if it employed the best possible methods and was protected by a tariff. It was suggested in various Papers at the Conference that these oil shales and cannels might be made the subject of treatment by hydrogenation, either directly or by hydro-generating the oil, or by the Fischer-Tropsch process. It hardly seems to us that the cannel coals are as suitable for the Fischer-Tropsch process as is bituminous coal. Something might have been done in the direction of hydrogenation, especially if the oils could have been produced at a reasonable price. If the coal industry is sincere in its expressed desire—expressed through the Scottish Oil from Coal Committee—to utilize its cannel coal, arrangements with the Gas Industry would seem to be the most feasible method, preferably coupled with arrangements to hydrogenate the oils produced. A combined scheme of that character would seem to have distinct possibilities for the rehabilitation of the Scottish cannel coal industry.

Regional Planning

A highly interesting move, and one to be welcomed, has been made by the Manchester Corporation. The idea at the back of the scheme is to organize the more important municipal services on a regional rather than a "Manchester" basis. A special committee, on which the interests of gas are naturally represented, has been appointed, states *The Times*, to investigate the possibility of co-ordinating a number of the public services of the city and local government areas. The first duty of the committee is to report on the advisability of a regional authority being formed for all or any of the local government services in Manchester and district. Local pride and local prejudice are as strong in Lancashire as elsewhere (including Yorkshire), and the committee have a difficult and delicate task. But regional planning becomes more desirable and more necessary, and Manchester, instead of toying with a pleasant notion, is taking active steps to find out what practicable and beneficial steps can be taken. The report of the committee will make valuable reading and may point the way to a more constructive policy.

"GAS JOURNAL" Directory

In order that readers may be able to keep the particulars contained in the "JOURNAL" Directory up to date, we summarize in the following list various changes which have occurred during the past month:

Page 10. BRIGHTON. G. M. Burton appointed S. vice H. C. Burton, who is elected to the Board of Directors.
„ 14. CAMPDEN. L. E. Twycross, Jt. M.D., deceased.
„ 16. CHELTENHAM. L. E. Twycross, E. & W.M., deceased.
„ 34. HORSHAM. J. W. Halstead, E. & M.D., retired. H. Rowland, S., appointed G.M.
„ 48. NEWCASTLE-UPON-TYNE. E. Crowther appointed C.E. and Assist. G.M. as from Dec. 1.

Amalgamation and Grouping

Holyhead and North Wales and Bethesda.

The Bethesda (N. Wales) Urban District Council at a recent meeting discussed the offer of the Holyhead and North Wales Gas and Water Corporation, Ltd., to purchase the Bethesda Gas Undertaking for £800.

Personal

A well known figure in the Gas Industry has retired on attaining the age of 70 years. Mr. W. R. FRANCIS, Joint Managing Director of General Gas Appliances, Ltd., has been in the Gas Industry for over fifty years, and, on Aug. 31, retired from his position, remaining, however, a Director of the Company. In his earlier days, Mr. Francis represented John Wright & Co., in Scotland and North of England, and afterwards, in the Midlands and West of England, and South Wales. He then joined the Davis Gas Stove Company and represented them in the North of England and North Wales. In 1919, in conjunction with Mr. Stanley C. Whitfield, he founded the business of General Gas Appliances, Ltd., and from that time up to the present has been, with Mr. Whitfield, Joint Managing Director. Mr. Francis is very well known to many of the leading figures of the Gas Industry, whose good wishes we have no doubt will accompany him into his retirement.

Mr. S. F. CORBY, M.C., has been appointed Joint Managing Director in Mr. Francis' place, and Mr. H. HILSON WIGHTMAN, A.C.A., who has been the Secretary of the Company for the past ten years, has been appointed to the Board.

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Mr. W. L. PRICE, of the Coventry Gas Department, has been appointed Showroom Manager to the Boston Gas Light and Coke Company.

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The wedding took place at Long Eaton Parish Church on Aug. 27 of Miss Mary Stevenson, younger daughter of Mr. GEORGE STEVENSON, Engineer, Managing Director, and Secretary of the Long Eaton Gas Company, and Mrs. Stevenson, to Mr. Ronald Fletcher Houghton, of Long Eaton.

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Mr. EDWARD CROWTHER, whose appointment as Chief Engineer and Assistant General Manager to the Newcastle-upon-Tyne and Gateshead Gas Company was announced in the "JOURNAL" last week, has seen nearly twenty years' service in the Gas Industry and has gained practical experience in a number of different undertakings. Commencing in 1919 as Technical Assistant to the Aldershot Gas Company, he was appointed the following year to the position of Assistant at the Wallasey Gas and Water Department. He took his degree of Master of Engineering at Liverpool University, and became an Associate Member of the Institution of Civil Engineers in 1921. From 1923 to 1927 Mr. Crowther was Chief Assistant to the Stoke Corporation Gas Department, being appointed in the latter year to the position of Deputy Engineer at Bradford. Four years later he succeeded to the chief executive position of that Undertaking—a post he held until 1934. In this year he was appointed Engineer and Manager to the Salford Corporation Gas Department—a position he occupied until his appointment as Chief Engineer and Manager to the United Kingdom Gas Corporation early in 1937. Mr. Crowther was elected to the Council of The Institution of Gas Engineers about two years ago and has served on the Board of Examiners for approximately the same period.

Obituary

E. W. SMITH.

The funeral of Mr. Ernest William Smith took place on Aug. 23 at Highgate Cemetery, where a gathering numbering several hundred assembled to pay their last respects.

Mr. Smith, who passed away on the previous Thursday at the age of 59, was Chairman and Managing Director of Smith Meters, Ltd., a Director of the United Gas Industries, Ltd., and a prominent member of the Beaconsfield Lodge of Freemasons, No. 1662. The burial service was conducted by the Rev. E. J. Jackson, and the family mourners were Mr. Douglas Smith and Mr. Basil Smith (sons), Mr. and Mrs. Lewis Smith (brother and sister-in-law), Mr. Norman Smith and Mr. Bernard Smith (nephews), and Mr. R. Turton (brother-in-law). Smith Meters, Ltd., was represented by Mr. R. G. Gaskin and Mr. A. Wallington (Private Secretary to Mr. Smith) (Kennington Works), and Mr. A. Charles and Mr. H. E. Angold (Streatham Works), with a large number of the employees of each district. The United Gas Industries were represented by Mr. Stephen Simpson, Mr. F. Blanchford, Mr. Sandford Robinson, Mr. Thornton Willey, and Mr. G. H. Robinson (Directors).

Others present included Mr. C. G. Langford (Society of British Gas Industries), Mr. Arthur Tennant (representing the Directors of the East Surrey Gas Company and also Associated Gas and Water Undertakings, Ltd.), with Mr. J. R. W. Alexander, Mr. W. W. Parkinson (Deputy-Chairman of Parkinson & Cowan, Ltd.), Mr. T. A. Braddock (Meters, Ltd.), and Mr. C. H. A. Kempton.

An Appreciation.

The world of the Gas Industry and the Gas Meter Industry in particular has suffered an irreparable loss by the passing of E. W. Smith.

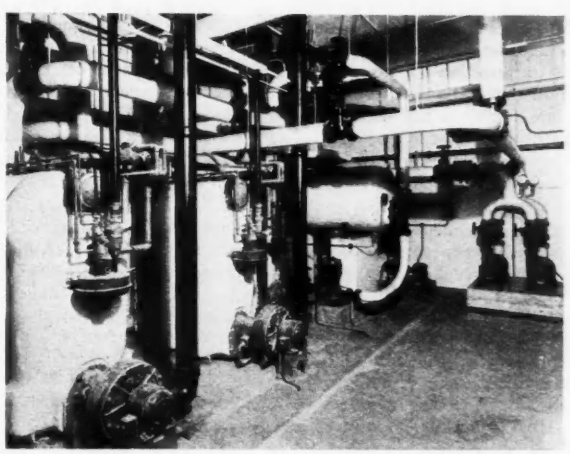
Born in the very atmosphere of gas meters and kindred trades, he inherited with his brother, Lewis, the business established in 1834. By dint of application and industry Smith Meters, Ltd., was raised from the mediocre conditions, so common among meter firms in those days, to that of one of the foremost meter manufacturers of these times. The works at Kennington are second to none for meter assembly and the extensive plant at Streatham, where all kinds of productions are turned out by the very latest expensive machinery, were all built up under his untiring personal direction, and he was always proud to conduct an interested person through these works. Almost legion are the patented designs of meters and prepayment attachments which demonstrate an unbroken desire for perfection, to meet the needs of a progressive industry.

Speaking from a personal knowledge of more than thirty years, one must admit that E. W. Smith was a tower of strength, with a heart of gold. Many are the tributes which could be paid to his generosity to his staff, from the highest down to the most humble employees and their dependants. He never tired of discussing the improvement of his products in the interests of the requirements of the Gas Industry. Among his friends there were numbered the highest in rank in the Industry, but that did not prevent a kindly word or a prolonged educational chat with the lower ranks. With his competitors in business he was always *bon ami;* he enjoyed a discussion however tense and would generally contribute to a discussion sound reasoning, born of a keen business perception and sound foresight.

So passes a genius in his generation. A. T. G.

Big Central Heating Installation

The *North-Eastern Gazette,* which is printed and published in Middlesbrough, and has a wide circulation over the North of England, has recently been transferred to new headquarters in the centre of the town. The new building is a very fine one built in Portland stone, and in equipping it no effort has been spared to ensure that the production will be carried out under the most up-to-date conditions. Gas plays a very prominent part in the equipment, and the consumption is anticipated to reach 12 million cu.ft. per annum.



The boiler house is a very spacious room, with the walls tiled from floor to ceiling. There are two Vesta C2 gas-fired boilers for central heating with a capacity of 1,600,000 B.Th.U. per hour, and for the hot water supply, one Vesta gas-fired boiler of 250,000 B.Th.U. per hour capacity.

Gas is used also for the six linotype machines and for metal melting. There are two stereotype machines, one 5-ton and one 3½-ton, and three ovens. The repair shop and the process department each use a considerable quantity of gas, and the canteen is fully equipped with gas cooking apparatus and an L 1,000 refrigerator.

News of the Week

For a New Gasholder, the Darlington Town Council has decided to purchase 4,900 sq.yd. of land on the north side of Coniscliffe Road.

First Prize was secured by the Long Eaton Gas Company in the Tradesmen's Advertising Display section of Draycott's fourteenth annual carnival on Aug. 20.

A Series of Cookery Demonstrations are to be held by the Grantham Gas Company in the demonstration room, Elmer Street, Grantham, from Sept. 6 onwards. The demonstrator is Miss M. L. Wilson.

The Annual Dinner of the Coke Oven Managers' Association will be held at the Hotel Victoria, Northumberland Avenue, London, on Oct. 27, when the Right Honourable Sir T. W. H. Inskip, C.B.E., K.C., Minister for the Co-Ordination of Defence, will be the principal guest of the evening.

For a Supply of Coke Oven Gas, the Burnley Gas Committee has decided that the Chairman, Vice-Chairman, the Town Clerk, and the Gas Engineer and Manager, Mr. A. F. Ames, be authorized to negotiate the terms of a new agreement with the Lancashire Foundry Coke Company, Ltd.

Application has been Made to the Board of Trade under provisions of Section I of the Gas Regulation Act, 1920, for an amending order providing for the revision of the powers of charging which may be exercised by the Hornsey Gas Company by substituting for the standard price of 1s. per therm one of 1s. 1d. per therm.

To Improve the Public Lighting of Lincoln, the Gas Department have installed 26 new 1,000 c.p. lamps in the City from the west end of Guildhall Street, along Newland and Carholme Road, up to Gresham Street. A powerful new lamp has also been installed at the junction of the five roads which meet at Beaumont Fee.

An Exhibition of Industrial Appliances organized by the Ashton-under-Lyne and Mossley and Saddleworth Gas Companies was opened on Monday in the demonstration theatre at Oldham Road, Ashton-under-Lyne. The exhibits include: Canteen equipment by Radiation Ltd., catering equipment, hairdressing equipment, central heating apparatus, hot water apparatus, fish frying apparatus, and shop heating apparatus. The exhibition is being continued until Sept. 16.

As a Safety Measure, it has been suggested that the word "Leicester" painted on the main gasholder in Aylestone Road, Leicester, shall be painted out. For some time the sign has acted as a direction-post to airmen but air raid precautions officers consider that the sign would also help enemy bombers, as the letters are visible at a height of 10,000 ft. for many miles round. The Gas Department has approached the Air Ministry on the matter, as the holders are being repainted, and official instructions are awaited.

The Floodlighting of the Gas Pavilion at the Empire Exhibition, suspended during the months of July and August, was resumed last week, four additional lamps being used as compared with the previous number. Floodlighting by gas was also inaugurated at the *Evening News* Pavilion. The prizes in connexion with the balloon competition, sponsored by the British Gas Federation and Glasgow Corporation Gas Department, will be presented this month. A large number of balloons have been returned, these coming from as far North as Skye and as far South as Chelmsford, Essex. Up to the end of August over 350,000 persons had visited the Gas Pavilion.

An Increase in the Price of Gas is announced by the Aberdeen Gas Department on the recommendation of the Gas Committee. The basic price of gas per quarter is to be increased from 2s. 3d. per 1,000 cu.ft. for the first 5,000 cu.ft. to 2s. 4d. per 1,000 cu.ft. for the first 10,000 cu.ft. The present charge of 1s. 9d. per 1,000 cu.ft. for the next 45,000 cu.ft. is to apply only to the next 40,000 cu.ft. It was also recommended that the prepayment meter rate should be a penny for 32 cu.ft. instead of a penny for 35 cu.ft. as at present. The increase is stated to be due to the rise in the cost of coal, labour, and material, and to a decreasing revenue from coke and residual products.

Members of Jarrow Corporation, including the Mayor (Alderman T. O'Connor), recently made a tour of inspection of several street lighting installations on Tyneside which have been carried out by the Newcastle-upon-Tyne and Gateshead Gas Company. The members were the guests of the Gas Company and were in charge of Mr. J. E. White, Chief Technical Officer, and Mr. J. P. Medd, Assistant Technical Officer. The party saw the several installations under normal conditions and inspections were made of the lighting at Gosforth, Shiremoor, Earsdon, Monkseaton, Whitley Bay, which is all gas lighted, Cowgate, Newcastle, and Felling.

Lighting in Accordance with the Recommendations of the Ministry of Transport is to be undertaken at Blackburn, where the Corporation Street Lighting Committee have recently considered reports of the Borough Engineer, Gas Engineer, and Electrical Engineer concerning the future policy of street lighting in the Borough. A resolution was passed expressing the opinion that the lighting of roads set out in a schedule accompanying such reports should be improved to the standard advocated by the Ministry of Transport at an estimated cost of £24,000, and the Finance Committee were recommended to allocate for this purpose £8,000 per annum for the three years commencing 1939-40 for the purpose of carrying out such improvements. A report is to be prepared for submission to the Finance Committee setting out the roads affected and giving a summary of the capital cost of these suggested improvements by gas and electricity.

Forthcoming Engagements

September.

8.—**North British Association.**—Annual Meeting at Largs.
10.—**Junior Gas Association.**—Joint Visit to Empire Exhibition, Glasgow.
12.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
12.—**L.C.C.A.**—Technical Committee, 11.30 a.m.
13.—**N.G.C.**—Central Executive Board, Gas Industry House, 2.45 p.m. (Not 2.30 p.m. as previously announced.)
15.—**I.G.E.**—Finance Committee (instead of Sept. 13), 1.45 p.m.; Membership Committee (instead of Sept. 13), 2.15 p.m.; General Purposes Committee, 3 p.m.; Refractory Materials Joint Committee, 3 p.m.
15.—**Midland Juniors.**—Visit to Nottingham to inspect Gas Heated Swimming Pools.
15.—**S.B.G.I.**—Council, 2.30 p.m.
15.—**Wales and Mon. Association.**—General Meeting at Porthcawl.
20.—**B.C.G.A.**—Meeting of the Executive Committee, 2.30 p.m.
20.—**I.G.E.**—Gas Education Executive Committee, 2.30 p.m.
22.—**I.G.E.**—Gas-Works Safety Rules Committee, 2.30 p.m.
23.—**I.G.E.**—Joint Lighting Committee, 2.30 p.m.
26.—**L.C.C.A.**—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
28.—**I.G.E.**—Pipes Committee, 2.30 p.m.
30.—**I.G.E.**—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.

October.

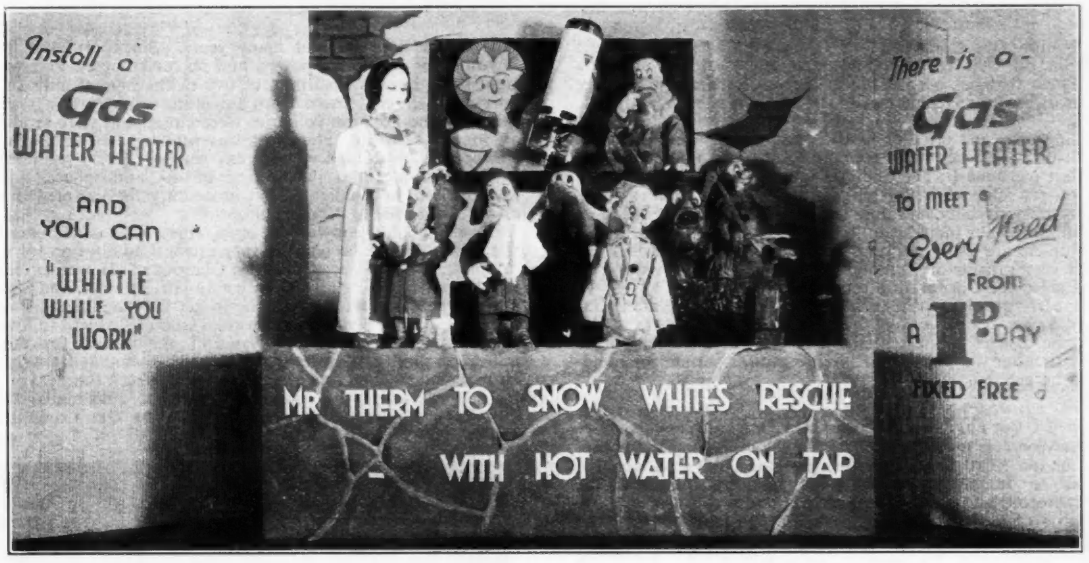
1-4.—**B.C.G.A.**—Annual General Meeting and Conference at Brighton (for Programme see p. 34 of "JOURNAL" for July 6).
6.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
7.—**I.G.E.**—Joint Committee on Complete Gasification Under Pressure (16, Old Queen Street, S.W.1), 3 p.m.
7.—**North of England Association.**—Autumn Meeting at Sunderland.
7.—**Southern Association (Eastern District).**—Meeting at Gas Industry House, 2.30 p.m. Discussion on A.R.P.
10.—**I.G.E.**—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.
11.—**I.G.E.**—Council, 10 a.m.
12.—**I.G.E.**—Board of Examiners, 2.30 p.m.
13.—**Midland Association.**—Autumn General Meeting, Grand Hotel, Birmingham.
18.—**I.G.E.**—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
20.—**Eastern Counties Association.**—Autumn Meeting at Gas Industry House, 2 p.m.
27.—**Coke Oven Managers' Association.**—Annual Dinner, Hotel Victoria, Northumberland Avenue, London.

A SNOW WHITE WASH IS NOT A FAIRY TALE
with a BRISK GAS WASHING MACHINE
GAS FOR A SPEEDY WASHDAY
SNOW WHITE and the SEVEN DWARFS showing at the GAUMONT from SEPT. 4th

"Snow White"

Takes a Hand in Gas Publicity

The Gas Industry has lost no time in turning the popular film, "Snow White and the Seven Dwarfs" to good use as a publicity medium, as the accompanying ingenious link-ups from Coventry and Birmingham show. Animated displays of this description may be hired from the Walt Disney Agents, and invariably attract a great deal of public interest.



Wales and Monmouthshire Association

A General Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers will be held on Thursday, Sept. 15, in the Grand Pavilion, Esplanade, Porthcawl, at 11 a.m., under the Presidency of Mr. J. Stephenson.

Following the usual business of the meeting a Paper will be presented by Mr. A. D. Howells, Engineer and Manager of the Abergavenny Corporation Gas Department, on "The Development of a Small Undertaking." The meeting will adjourn at 1 p.m. for luncheon at the Esplanade Hotel.

Athletic and Social

Cambridge Bowls Success.

As an opportunity for wiping out its defeat earlier in the season, the bowls team of the Cambridge University and Town Gas Light Company anticipated the return fixture with the Northampton Company's bowlers with great pleasure. After some very keen play on Aug. 20, the home club was successful by 86 woods to 64, and the remainder of the evening was spent in a delightful atmosphere of hearty sociability.

Canterbury Sports.

The second annual sports of the Canterbury Gas and Water Company Sports and Social Club were held at Canterbury on Aug. 28. Tea was served in the pavilion to members and their families. The prizes were presented by Mrs. R. Vevers Scott, to whom Miss Janet Lancefield handed a bouquet.

After the sports meeting an entertainment was held in the pavilion, during which the President (Mr. R. Vevers Scott, Engineer of the Company) thanked all who had helped to make the day a success.

26,640 Spectators See "New World" Cooker Sign

The recent match between Aston Villa and West Bromwich Albion, in aid of the Football League Jubilee Trust, ended very fittingly in a draw. The 26,640 spectators could not have failed to see the "New World" gas cooker sign, which is over 30 ft. long and 6 ft. high, and has been erected on the Villa Park ground.

New Showroom for Stockport Gas Department

AT

Poynton

The premises were opened on Aug. 27 by the Mayor of Stockport to serve consumers in this rapidly developing area which was taken over some three years ago.

The Poynton Gas Company was taken over by the Stockport Corporation on Oct. 1, 1935, and it is interesting to note the great progress that has been made in the district since then under the enterprising management of the Gas Engineer, Mr. T. Reynolds.

On taking over, the price of gas was immediately reduced from a net cost of 5s. 9d. per 1,000 cu.ft. to 3s. 7d. per 1,000 cu.ft. for the smallest consumer. The appreciation of this is shown by the amount of gas sold, which in the year 1935 was 12 million cu.ft., while for the year ended March last the consumption was over 20 million cu.ft.—an increase of 66⅔% in three years. Over 300 new consumers are using gas, and the sale of new appliances has also been very satisfactory, amounting to 780 appliances of varying types since the Corporation took over.

It was early recognized that in purchasing the Poynton Gas Company a very valuable area had been acquired, and a showroom in the district was essential. For this reason a temporary wooden structure was placed on this site until a permanent building could be erected.

The New Showroom.

The showroom is a single storey building occupying the corner site on London Road South and Georges Road, Poynton, and has been built to designs prepared by Mr. Wm. F. Gardner (the Stockport Borough Engineer and Surveyor).

It consists of a showroom approximately 36 ft. by 34 ft., with counter and manager's office, and at the rear are a storeroom 24 ft. by 26 ft., a central heating boiler house, and cloakroom accommodation.

The woodwork of the interior is in Austrian oak, wax polished, and the decoration of the walls and ceiling is in the modern style starting with flame colour above a black skirting board, and shading off through yellow to a cream upper wall surface and ceiling. The lighting of the showroom is by eight Evered ventilated ceiling lights of pleasing design operated by switches, and bracket lamps are placed in suitable positions on the walls.

Two panel type gas fires have been arranged along one wall, ventilated by "Nautilus" flues, and a tiled surround on the adjacent wall is fitted with a coke burning grate. A stand for displaying six gas fires is placed in a convenient position in the centre of the floor. The floor of the showroom has been furnished with a rubber covering of artistic design with various colourings matching the wall and ceiling decorations.

The premises are heated by a gas-fired central heating boiler circulating hot water through panel radiators, and a display of various types of apparatus for water heating is arranged on a wall adjacent to a window and easily viewed from outside. Each type of heater is connected up with gas and water for practical demonstrations, the hot water running to waste from a continuous stainless steel trough beneath the display.

The exterior walls are of sand-faced bricks, the joints being pointed with white mortar. Artificial stone sills and cornice give relief to the brickwork. The roof is flat, composed of concrete with asphalt waterproofing, and all drainage is taken to the rear of the premises so that no downspouts are seen to mar the elevation. The large windows give a full view of the whole interior of the showrooms, and the lettering above the windows is in coloured enamel set in bronze frames, fixed to the artificial stone string course, the word "Gas" being prominently displayed over the corner entrance in larger letters than the remainder.

The Opening Ceremony.

Alderman Sir Thomas Rowbotham, J.P. (Chairman of the Gas Committee), presided at the opening ceremony.

Sir THOMAS said that the link between Stockport and Poynton had been a close one for many years. Stockport used to go to Poynton for its motive power, and he remembered that when for eight years he was Chairman of two of the biggest mills in Stockport all their coal came from Poynton. To-day things were reversed. The Poynton collieries were closed and were sending coal no longer. Instead, Stockport was sending coal to Poynton—in concentrated form and without any smoke. Every gas fire burned in Poynton meant a purification of the atmosphere, and since Poynton was in a delightful bit of country they wanted to keep it as pure and sweet as they could.

Declaring the showroom open, the MAYOR (Councillor H. Shepherdson) said he had the very greatest admiration for the Gas Committee, and especially for its Chairman. He remembered the bitter opposition that was shown to Sir Thomas and the Committee when they were struggling to get the magnificent showroom in St Petersgate, but the enormous success which followed the opening of that showroom was full justification for the Committee's policy. "I hope that the success of that showroom will be repeated in Poynton, if in a lesser degree," the Mayor added. He congratulated the Chairman, Committee, and management on the wonderful work they were doing. The Gas Committee was

An Interior View of the Showroom.

one of vision, he said, and he hoped that Sir Thomas would continue to guide it for many years to come.

Mr. W. H. HUNT, proposing a vote of thanks to the Mayor, said Poynton was grateful for the facilities given to it. When the change-over took place some of them had misgivings as to what would happen; but he could congratulate the Stockport Gas Department on the very efficient way in which it was run. The erection of the showroom in Poynton was accepted as a fine gesture, and he hoped that so far from proving a venture it would be of great value to the Undertaking. In developing their rural areas, he said, it would be disastrous if they lost sight of the smoke nuisance. Mr. T. S. PETERS seconded, and said that since Stockport acquired the Poynton Undertaking every consideration had been given to requests and wishes of the Parish Council, and Poynton men had been taken into the Department's employment.

The MAYOR, responding, complimented the architect's department of the Corporation on the preparation of the plans, and also the builders on a fine job.

Automatic Operation of Water Gas Plant

The technical details of an automatic operator for small and medium-sized water gas plants designed and constructed by Messrs. Henry Balfour & Co., Ltd., Leven.

The device incorporates a rotary cam mechanism, which is rotated intermittently by a motor gear unit, the circuit of which is periodically closed and interrupted to start and stop the motor. A solenoid switch is provided for switching on the motor current, the closing of the solenoid switch being effected by a time clock at predetermined times in accordance with the requirements of the operation of the plant. For switching off the motor, a commutator is provided on the operator.

With water gas plants which are not automatically charged with fuel, there is a position of the various operating valves at which

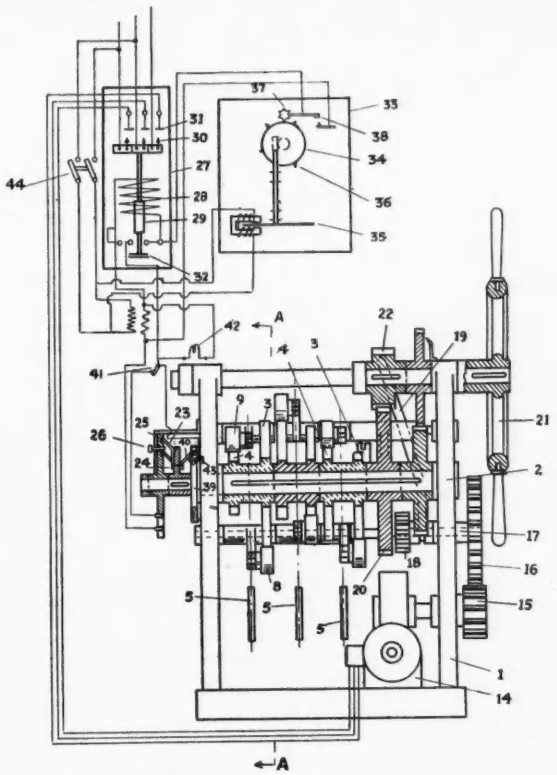


Fig. 1.—Details and Circuit of Automatic Operator.

it is usual and convenient to shut down or "idle" the plant and at which it is safe to charge the generator with coke or other fuel. It is neither safe nor convenient to effect the charging of fuel to the generator at any other position of the operating valves. This position of the valves of the plant to distinguish it from the "blow" and the "run" positions may be termed the "no run" position. The automatic control mechanism as described below is adapted to effect the stoppage of the mechanism automatically at the "no run" position when desired.

The usual arrangement is that the time switch is set in motion by means of an eddy current motor. On the periphery of the time wheel of this switch there are fixed several adjustable strikers. These strikers close the contact for about one or two seconds. This closure of the contact energizes the solenoid switch and the motor rotates. The motor through the gear train provided sets the valve-operating cams rotating. The commutator fixed to the cam shaft ensures that the motor continues to receive current even though the time switch contact is broken. When the shaft has undergone a partial revolution the contact of the commutator is broken, the motor circuit interrupted and the motor ceases to operate. The next partial rotation is effected as soon as the next striker on the time wheel closes the time switch contacts.

To effect stoppage of the motor when the "no-run" position is reached, there is provided an additional contact disc, having a complete contact ring wiped by a contact carried by the rotary arm secured to the cam shaft. The rotary arm contacts, which wipe the two contact discs, are electrically connected and the electric circuit which includes the contact ring of the additional contact disc, also includes a manually operated single pole switch and a lamp or other visual indicator. The cams are carried by a shaft and are arranged so that a predetermined angular position of the cam shaft operating the valves corresponds to the "no-run" position.

An adjustable interrupter associated with the additional contact disc is adapted to break electrical contact between the contact ring of this disc and its co-operative wiping contact when the cam shaft reaches a position corresponding to the "no-run" position.

Reference to Fig. 1 will show that the actuation of cam shaft 2 is effected by means of an electrical motor 14, which drives by means of the lay mechanism 15 and 16 a shaft 17, on which is mounted a slidable pinion 18. By sheathing the lever 19, the pinion 18 can be brought into engagement with the spur wheel 20 keyed on the shaft 2 so as to establish a driving connexion between the motor 14 and the shaft 2.

In order to be able to actuate the cam mechanism also by hand, there is provided a hand wheel 21 whereby the spur wheel can be actuated by means of the pinion 22. At one end of the shaft 2 there is keyed a contact arm 24 provided with spring contacts 23. These contacts 23 engage contact rings on a stationary contact disc 25 and are at predetermined times lifted away from the disc 25 by interrupters 26. The switching-on and switching-off of the motor 14 is effected by means of the solenoid switch 27, which is closed as soon as current flows through the coil 28, whereby the core 29 is attracted and the contacts 30 are engaged with the contacts 31. Beneath the core 29 is an additional contact 32 which closes a holding circuit, the purpose of which is explained below.

The closing of the solenoid switch is effected at predetermined times by the contact clock 33. This contact clock incorporates a time wheel 34 set in uniform rotation by an eddy current motor 35. On the time wheel 34 are arranged riders 36 which can be shifted at will and adjusted in accordance with the desired cycle. The riders impart a rotary movement to the star wheel 37 which closes the contact 38 for a short interval, usually about 1 to 2 seconds.

The operation of the device is as follows:

At determined times, fixed by the cycle of operation (controlled by adjustment of the riders 36 on the wheel 34), the star wheel 37 is caused to rotate and thus temporarily closes the contact 38. Current therefore can flow through the solenoid coil 28, so that the core 29 is attracted and the contacts 30 and 31 engaged. The motor circuit is closed and the motor 14 rotates. The contact 32 has at the same time closed the holding circuit which is controlled by the commutator disc 25, so that after the opening of the contact 38, the coil 28 continues to be energized and the contacts 30 and 31 remain engaged. When the cam shaft 2 has performed the desired partial rotation and has effected by means of the cams 3 and 4 the desired actuation of the water gas plant, the contact 23 is lifted by the interrupter 26, so that the holding circuit is

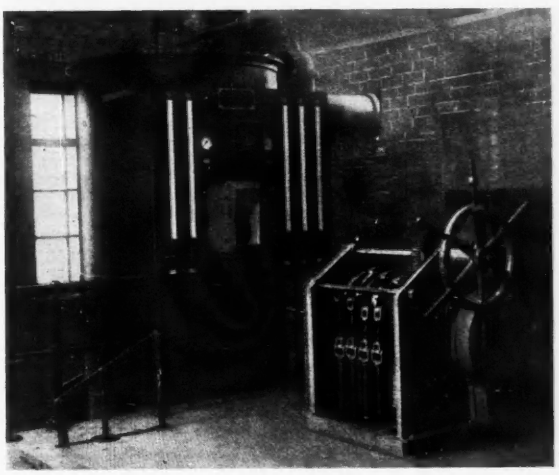


Fig. 2.—Operator, Gauge Board, Panel, and Time Switch.

interrupted and the core 29 again returns to its original position, so that the contacts 30 and 31 are opened and motor remains at rest. The motor 14 is provided with an electrical brake so that the moment the circuit is broken the brake comes into action and stops the motor almost instantaneously. This operation is repeated at the several positions determined by the adjustment of the riders 36.

In order to stop the plant for clinkering or charging the coke, or when the plant is required to idle, an arrangement is provided for doing this at the no-run state. To enable this to be done, a further commutator disc 39 is mounted on the operator and fitted with a interrupter 43 which is set to break contact 40 with the ring of the commutator disc 39 when the cam shaft 2 is in the no-run position.

When the single pole switch 41 is closed, the path of the solenoid switch holding current is solely effected by way of the commutator disc 25. When the switch is open, this path has to be maintained by way of the outer contact ring of the commutator disc 25 and the contact ring of the commutator disc 39. The interrupter 43, equivalent to the no-run position of the cam shaft, then only comes into operation when the switch is open. The commutator disc 43, however, maintains a current through the lamp 42, which is only broken by means of the interrupter 43. The cam shaft 2, when the switch 41 is closed, carries through the no-run position when being rotated from the final up run to the blow. When the switch 41 is open, the cam shaft 2 is stopped at the no-run position and the lamp goes out. When the lamp goes out the attendant opens the switch 44, stopping both the time clock and the automatic operator. This enables the plant to stand in a state in which it can be safely clinkered, charged with fuel or left idling. When the plant is to be restarted the attendant rotates the cam shaft by hand from the no-run to the blow position and then closes the switches 41 and 44 and the plant is then put on automatic operation and commences to carry through the cyclic operation according to the setting of the time clock riders.

"Active" Carbon from British Coal

Production in Gas-Making Retorts

Active carbon of a high quality required in large quantities for gas masks and for a number of industrial processes can now be produced in this country from graded lump coal. Hitherto a large proportion, made by other methods, had been imported from abroad. The new process has been developed as a result of a successful investigation carried out jointly by the Fuel Research organization of the Department of Scientific and Industrial Research and the Chemical Defence Research Department. An account of the investigation, the cost of which has been borne by the War Office, and of the results obtained is contained in a publication issued by the Department of Scientific and Industrial Research (Fuel Research Technical Paper No. 47, "The Production of Active Carbon from Bituminous Coal," H.M. Stationery Office, price 1s. 3d. net).

The present investigation was undertaken with a view to using carefully graded lump coal, so as to dispense with the necessity for grinding and briquetting, and thus to reduce the cost of the finished product. The method constitutes a radical departure from previous practice.

The report discusses the reasons for the employment of the briquetting process. When coal is carbonized the escaping gas, tar, and steam give the remaining coke a cellular structure. The existence of these cells is essential if the coke is to be converted into active carbon. But with caking coals used for the production of ordinary cokes the cells are relatively large, and consequently the total internal surface active in adsorbing vapours, &c., is correspondingly small. Any attempt to produce a larger active surface by exposing the coke to reagents, such as steam, only makes the cells larger and thus has the opposite effect to that desired. With non-caking coals a weak coke having no cell structure visible to the eye is produced.

Hitherto the difficulty has been got over by suitably blending caking and non-caking coals and carbonizing briquettes made from the blended material. Knowledge resulting from the work of the Physical and Chemical Survey of our National Coal Resources, whose headquarters are at the Fuel Research Station, suggested that coals were available which had, as a natural property, the correct degree of caking power to give strong hard coke without a large cell structure. Such coals are found in the dull hard coal, or durains, occurring in bands of sufficient thickness to be separated by hand from the bright coal, in the Nottingham, Derbyshire, and South Yorkshire coalfields. Other possible coals are the "hards" from Northumberland, Warwickshire slate coal, certain coals from Fife and South Wales. All the coals tested were not found to be equally satisfactory, but the reserves of coal suitable for the preparation of high-grade active carbon disclosed by the experiments are much greater than are likely to be required. Some of the best results were obtained from Sherwood Hards, and this coal was chosen for full-scale experiments.

The Method of Production.

In the early stages of the investigation, when the quantities of coal obtained for trial were usually small, the procedure adopted was to carbonize the coal at about 480° C. in small-scale retorts at the Fuel Research Station at Greenwich, and to activate the resulting coke in a specially designed laboratory apparatus at the Chemical Defence Research Department's laboratories at Porton. Where sufficiently large quantities of coal were obtained—mainly in the later stages of the investigation—the activation was carried out in a semi-technical plant at the Fuel Research Station. During this period the effects of a number of variables in the process were examined. An extended range of coals, including anthracites and carbonaceous coals, was tested, and certain experiments on blending and briquetting prior to carbonization were carried out.

Having achieved success in the production of satisfactory carbon from graded lump coal, the next step was to determine whether the process would work satisfactorily on a full technical scale. The carbonizing plant at the Fuel Research Station includes two settings of retorts of similar design, erected for experimental work on the production of smokeless domestic fuel by low temperature carbonization. These retorts were eminently suited to the first stage of the process, namely, the carbonization of the graded coal. The retorts in one of the settings were built of silica brick, and it was decided to use one of these for the second or activation stage, for which a higher temperature was necessary. One possibility which was visualized during this phase of the investigation was that of using continuous vertical gas retorts for the manufacture of active carbon on a commercial scale. Retorts of this type would obviously be suitable for the high-temperature activation stage of the process, but it was thought doubtful whether they could be operated at sufficiently low temperatures for the carbonizing stage without considerable modification of the method of heating to avoid risk of explosion in the cooler parts of the heating flues. Particular attention was therefore paid to this aspect of the process, and in addition certain experiments were carried out to determine whether, in full scale operation, higher carbonizing temperatures could be permitted without reducing the value of the finished carbon. The results showed that a coke prepared at 650° C. gave just as active a carbon as coke prepared at 480° C., while the strength of the product was greater.

The Results.

When graded to the correct size, the investigation proved that an activated carbon equal to first-grade commercial carbon for gas respirators can be made.

The activity of the carbons produced during the investigation was assessed by measuring their adsorptive power towards carbon tetrachloride vapour carried in an air stream, and, since physical strength is an important factor in certain of the purposes for which active carbon is used, the strength of each product was measured by subjecting it to a standard abrasive treatment. Both these methods of test are described in the report.

In addition, some practical tests were made of the suitability of the carbons for industrial use. In the realm of solvent recovery, it was found that the activity of the best carbon made was about 75% of that of good commercial carbons now available. This result is encouraging, and it is suggested that further research would probably find a means of modifying the properties of coal carbons to make them efficient for benzole recovery. A finely-divided grade of active carbon was found to decolorize crude sugar liquor almost as efficiently as the bone carbon normally employed, but the solution developed acidity too rapidly and this could not be overcome by alkali treatment: it is again suggested that further research might prove useful here. On the other hand, tests showed that the finely-divided carbon will efficiently decolorize liquids such as crude glycerine, and edible oils in some instances being superior to the carbon commonly employed.

Gas for Pottery Firing

At the recent Meeting of the British Association at Cambridge, Professor Gibson, President of Section "B," gave an Address on the Modern Chemistry of Gold, when he dealt with the use of gold for decorative purposes.

Mr. H. V. Thompson, the Principal of the Chemistry Department of the North Staffordshire Technical College, Stoke-on-Trent, demonstrated how gold is used for decorating pottery and fired specimens of pottery in a gas furnace. For this purpose he used china manufactured by the Colclough China Company, Ltd., of Longton, Stoke-on-Trent, and at the conclusion of the Meeting each of those in attendance was presented with a souvenir ash tray made by the Colclough China Company, Ltd., who are the largest makers of china in the world and at their new modern Pottery Works use gas exclusively for glost firing and decorating firing.

ASSOCIATION OF PUBLIC LIGHTING ENGINEERS

Bournemouth Sept. 5 to 8

Public Lighting by Gas in Small Towns

By W. HODKINSON

Introduction.

The United Kingdom Gas Corporation controls a total of 66 Gas Undertakings, and for the purpose of rendering assistance to these companies the Corporation has provided a central office staffed and equipped to enable the local management to obtain specialist advice and assistance on the many utilization problems which confront the Industry.

During the past three years this office has assisted the Constituent Companies of the Corporation in the preparation of numerous public lighting schemes in a number of small towns and villages throughout the country.

In this Paper I propose to describe in detail some of the installations erected during the past three years in areas supplied by the Corporation's Undertakings. I shall also refer to several aspects of the public lighting problems which have been brought forcibly to our notice, and which I believe will prove of general interest to the members of this Association.

During the period of the past four years careful consideration has been given to the problem of arriving at a method of evaluation of lighting results. Innumerable aspects of this subject have been discussed and an analysis of the opinions expressed indicate that even to-day one would have considerable difficulty in defining a specification of road illumination satisfactory to all authorities on the subject.

It is quite obvious that considerable diversity of opinion exists among experts concerning the basic principles of the street lighting problem, and to add further confusion to the position we find ourselves with an obsolete specification on the one hand, and on the other hand a scheme of recommendations without any leading specification.

The merit of a street lighting installation must be evaluated in terms of the ease and effectiveness of visibility; therefore it becomes apparent that at the present time the most effective method of arriving at a decision as to the relative merits of any installation is by examination of the installation at work on the road it is to serve and under the varying conditions it has to meet.

Having this point in mind we have adopted the practice of offering to provide and erect free of charge and without obligation, demonstration installations of not less than six lamps, in the road or roads to be lighted. From our experience to date we are quite satisfied that this is the only effective method of indicating to the Authority concerned what results they will obtain from any particular type of installation.

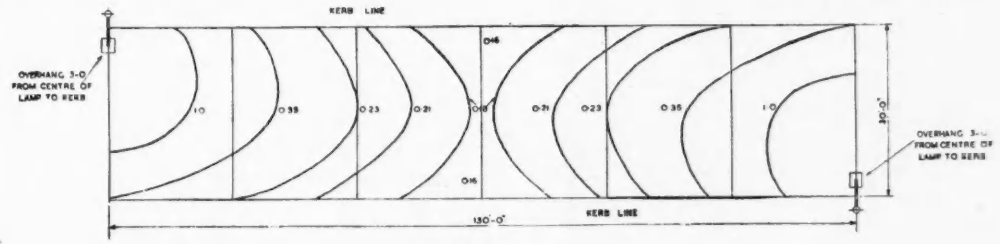
In the following descriptions of installations erected I have confined myself to submitting for your information, details of the installation, details of the roadway lighted, photographs, and an iso-foot-candle diagram for each installation.

Main Traffic Road Lighting.

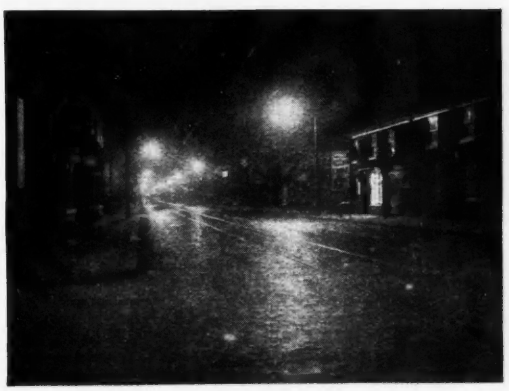
DENTON, LANCASHIRE.—The whole of the main traffic routes in this town amounting to approximately four miles of roadway are illuminated by means of modern low-pressure high efficiency gas lamps.

The installation consists of 12-light No. 2 size mantle "London" lamps supplied by Messrs. Wm. Sugg & Co., Ltd., fitted with constant pressure governors and "Comet" automatic ignition. The constructional details of this lamp are probably well known to members of this Association. The mantles are arranged in level alignment, directional equipment is fitted, consisting of mirror glass troughs of parabolic section. The reflector system is held in a rigid frame, which also carries a compensating reflector for the purpose of redirecting the light, which would otherwise be wasted above the horizontal, on to the road surface.

On this particular installation the lamps are mounted on the projecting arms of the existing tramway columns by means of a simple bracket arm attachment supplied by the lamp makers. The service pipes are carried up the side of the column to the lamp through the Horstmann Clock Con-



NO FOOT CANDLE DIAGRAM
LONDON LAMP INSTALLATION DENTON



troller and "Comet" igniter, which are strapped to the arm of the column. The use of these existing columns involved a certain restriction, inasmuch as we were unable to exceed a mounting height of 23 ft. 6 in. Fortunately the columns were well spaced, and we were able to adopt staggered formation quite evenly, and at the same time avoid columns carrying feeder cables.

A demonstration installation consisting of 25 lamps was erected in 1935. As a result of the satisfactory performance of this trial installation over a period of three months, we were successful in obtaining a contract for the whole of this lighting for a period of 10 years.

DETAILS OF THE INSTALLATION.

	Ft.	In.
Mounting height	23	6
Spacing (staggered)	130	0
Overhang from kerb	3	0
Width of road	30	0

Road surface: Setts. Rated output: 4,300 lumens per 100 ft.

This installation has been working for a period of three

years, and with adequate and reasonable maintenance, we have no difficulty in maintaining practically straight line illumination over long periods. The installation has proved particularly satisfactory from several points of view, kerb-line illumination is remarkably good, and the light distribution is particularly effective.

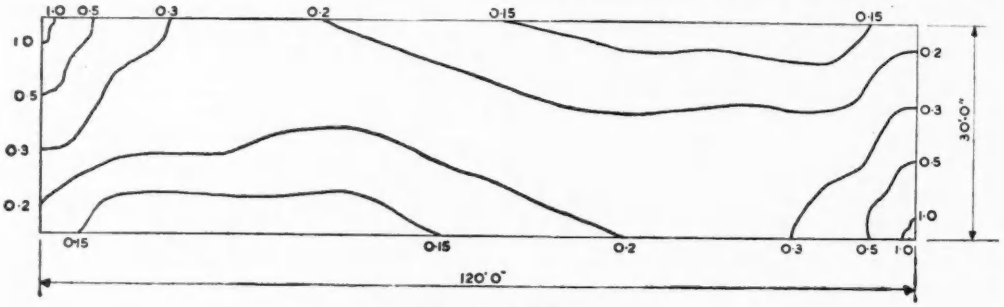
ORMSKIRK, LANCASHIRE.—The main traffic routes in this area amounting to a total of approximately three miles of roadway are illuminated by gas units installed during the period of the past four years. The installation consists primarily of 12- and 8-light No. 2 size mantle "Maxill" lamps supplied by Messrs. W. Parkinson & Co., Ltd. This lamp is fitted with two independently operated clusters of burners, behind which are fitted multifacet reflectors of anodized aluminium. The reflectors are so arranged that when the required position has been found they may be fixed in that position.

The lamps are mounted on "Adastra" type poles and are fitted with constant pressure governors and automatic "Comet" ignition.

DETAILS OF THE INSTALLATION.

	Ft.
Mounting height	25
Spacing (staggered)	120–150
Overhang from kerb	3
Width of road	30

Road surface: Tar with chippings.



150-FOOT CANDLE DIAGRAM
MAXILL LAMP INSTALLATTION - ORMSKIRK

The general illumination results obtained with this installation are extremely satisfactory, visibility which must be looked upon as the criterion of effectiveness is good, and free from discomfort due to glare or patchy illumination. The installation does not generally conform to the final report inasmuch as a large proportion of the 8-light lamps are spaced at 150 ft. reducing the rated output to below the minimum recommended. The installation was, however, designed to conform to the interim report which was available at that time.

The local Authority is well satisfied with the results obtained, and we have recently received an order to proceed with the erection of a further extension to this installation.

MORLEY, YORKSHIRE.—This installation, consisting of 12 lamps, was recently erected as a demonstration unit and is at the moment on trial. The results obtained are such that I believe they will prove of interest to you. The installation consists of 10-light No. 2 size mantle "Alpha" lamps supplied by Foster & Pullen Co., Ltd.; the lamp is of modern design and soundly constructed; it is fitted with burners in level alignment provided with two mirror units, each unit consisting of two mirrors above the mantles and one mirror below them. Each reflector unit is easily removed, and at the same time provision is made to ensure that neither the units nor independent mirrors can be misplaced or put out of focus.

The lamps are mounted on steel poles, fitted with internal service, and the lamps can be lowered to the required height for cleaning from ground level by means of "Wask" raising and lowering gear; the lamps are also fitted with constant pressure governors and automatic "Comet" ignition.

DETAILS OF THE INSTALLATION.

	Ft.
Mounting height	25
Spacing (staggered)	140
Overhang from kerb	3
Width of road	35

Road surface: Tar with chippings.

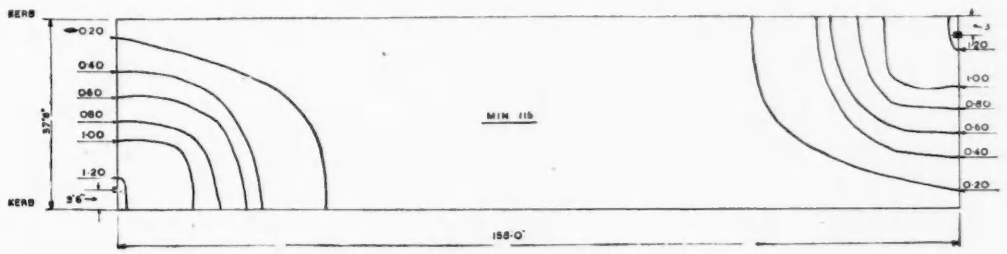
This installation has only been in operation for a period of six weeks, and therefore I hesitate to pass any remark as to its over-all efficiency. To date we are perfectly satisfied with the results obtained and local opinion is extremely favourable to the new type of lighting. We now await the expiration of the test period to hear the decision of the local Authority.

Many of the Constituent Companies of the Corporation have, within the last two years, erected demonstrations of modern Class A road lighting and as a result of the demonstration secured long period contracts for this work. In Scotland we have recently secured the contract for the Galston Council's main road lighting, using "London" lamps installed in accordance with the Ministry of Transport Departmental Committee's Report. This Authority has been so impressed with the results obtained by the use of modern gas equipment, that it is now giving serious consideration to the utilization of gas for by-road lighting.

We are satisfied that gas can still do a good job of work in the illumination of main arterial roads, and this opinion is confirmed by the amount of new business which we are obtaining in this direction.

Illuminated Guard-Posts.

Gas as a source of illumination for road signs and guard-posts has within recent years gained the support of a num-



150-FOOT CANDLE DIAGRAM
ALPHA LAMP INSTALLATION - MORLEY

ber of local authorities. Unfortunately there has recently been some criticism of the use of gas for this work on the grounds that, in the event of the post being knocked down by a vehicle, the escaping gas may result in fire and injury. As a precaution against such risk, a special valve designed to cut off the gas supply immediately the supply pipe is broken, has been devised by the Public Lighting Section of the Gas Light and Coke Company, and this device is now being fitted to all the guard-posts in that Company's area.

The illustration shows the method of application; the valve is inserted direct on the supply service as low down as possible, preferably below ground. Immediately above the valve a "weak link" in the form of a ⅛ in. diameter brass nipple is inserted to ensure that breakage will occur above the valve. The supply is then run in the ordinary way to the clock controller or distant control device, with a small brass tube returning from below the controller to the top of the valve.

The device consists of a very light diaphragm operated valve; the inlet gas passes to the underside of the diaphragm and descends past the valve to the burner. The pressure at the controller is conveyed to the top of the diaphragm by the small brass tube; therefore under normal conditions the pressure above and below the diaphragm being equal, the valve remains open.

Immediately breakage occurs in either the supply pipe or the small bore brass tube, the pressure above the diaphragm is reduced to atmospheric and the inlet pressure automatically closes the valve and cuts off the supply. The valve will not re-open until pressure is once more applied above the diaphragm.

The manufacture of this very useful valve is in the hands of Messrs. Wm. Sugg & Co., Ltd.

Side Road Lighting.

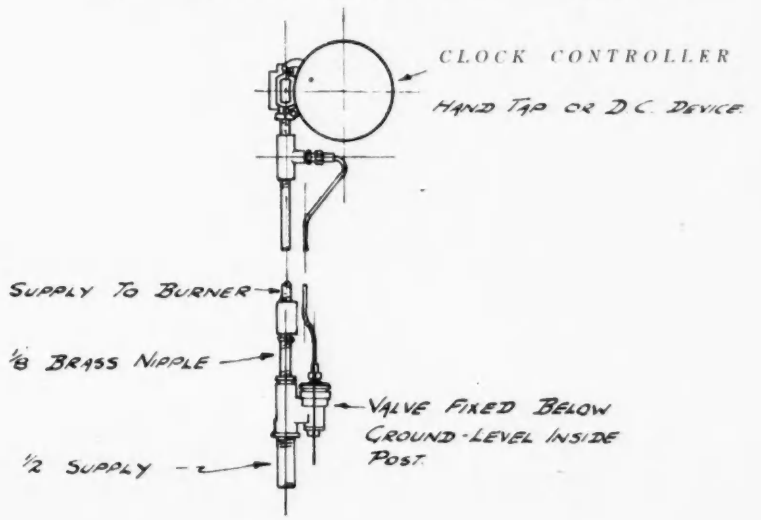
An examination of the literature relating to Street Lighting published during the period of the past four or five years reveals the amazing fact that practically no attention has been paid to the importance of illumination on side roads in spite of the fact that probably 75% of the lighting in the country is used for this purpose.

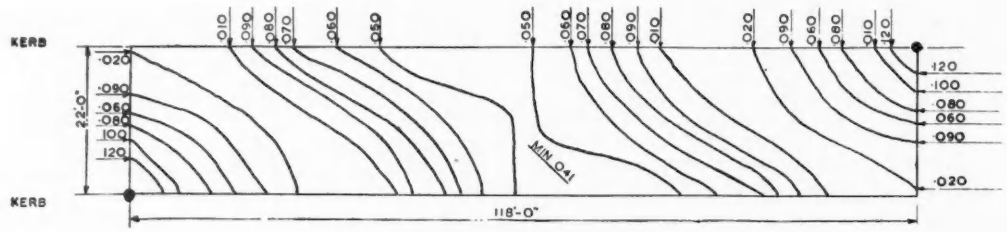
Side road lighting is primarily provided for the comfort and safety of the general public, and for this reason should be sufficiently adequate to light all corners, passages, &c. It has been proved that adequate lighting is the most successful deterrent to crime. Quite recently I heard of a case where a suburban district badly lighted had suffered an average of six cases per annum of various crimes. The lighting in this district was raised to modern standards and in the first twelve months there was a complete cessation of the trouble.

In the design of side road lighting installation, the scope is invariably limited by the question of costs, and the problem, therefore, resolves into a question of choice of the most suitable type of lamp for the particular road or roads, and siting the limited number of lamps available to the best advantage, having the previous points I have mentioned in mind.

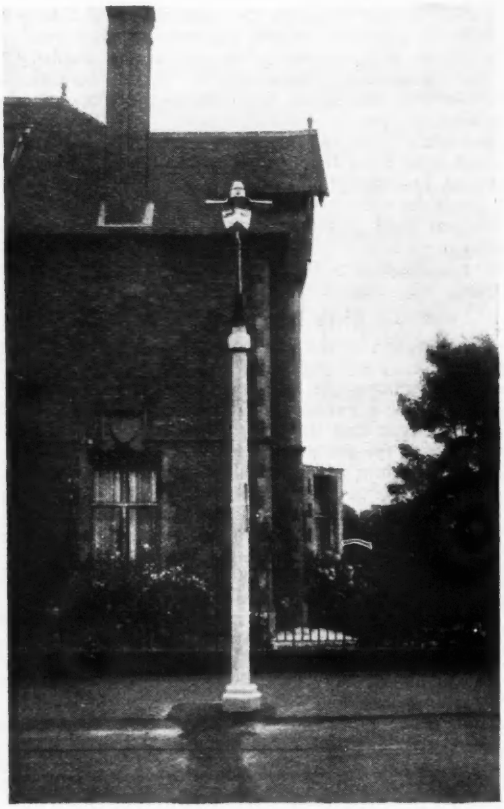
There is available an unlimited range of modern high effi-

Automatic Cut-off Valve for Illuminated Guard Posts.





150-FOOT CANDLE DIAGRAM
SIDEWAY LAMP INSTALLATION



ciency gas lamps capable of providing this service, and providing installations conforming to the requirements of the Ministry of Transport's recommendations.

For side road lighting I am of the opinion that even distribution of illumination leading to silhouette vision is the most important factor to be considered, and from this point of view I believe that gas as a medium of lighting has many peculiar advantages.

In several recent schemes for this type of lighting we have adopted the use of the "Sideway" type of lamp as supplied by Messrs. Foster & Pullen Co., Ltd., and the "8,000" lamp supplied by Messrs. Wm. Sugg & Co., Ltd.

The following installation erected in the area of one of our Yorkshire Companies has proved most satisfactory. The lamp in use in Messrs. Foster & Pullen's 4-light No. 2 size "Sideway" unit fitted with constant pressure governor, Newbridge Clock Controller, and automatic "Comet" igniters. This lamp has a cluster superheater burner in cast aluminium body, pear-shaped heat-resisting globe, and is fitted with adjustable two-way mirror glass reflectors.

DETAILS OF THE INSTALLATION.

	Ft.	In.	
Mounting height	13	6	to light source
Spacing (staggered)	120	0	
Width of road	22	0	

Road surface: Tarmac.

The installation is of modern and attractive design, and has proved extremely satisfactory. Maintenance can be carried out with ease, and this has consequently assisted in the reduction of maintenance charges.

SUSPENDED LAMPS.—A very effective installation, suitable for modern mounting heights and extremely attractive in appearance, can be obtained by the use of upright suspended "Rochester," "Arcturus," and "Stechford" lamps as supplied by Messrs. Sugg, Foster & Pullen, Ltd., and Wm. Parkinson & Son.

In a recent installation erected by one of our Constituent Companies we have used 6-light No. 2 size upright suspended "Arcturus" lamps as supplied by Messrs. Foster & Pullen Co., Ltd. The lamps are mounted on steel poles of simple design, and they are fitted with constant pressure governors, Newbridge Clock Controllers, and "Comet" automatic ignition; the controller and igniters are fixed in a neat cast-iron box positioned centrally to the two upright suspension arms.

DETAILS OF THE INSTALLATION.

	Ft.
Mounting height	15
Spacing (staggered)	120
Width of road	24

Road surface: Setts and tarmac.

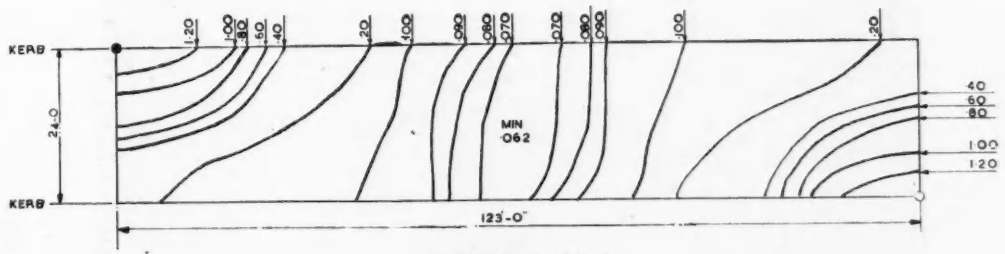
The rated output of these lamps spaced at 120 ft. can be taken at 2,500 lumens per 100 ft. linear. This can be considered a high class of lighting for a 24 ft. by-road subject to occasional traffic only; it has, however, proved to be what I consider a perfect example of lighting designed to give even illumination of the roadway, and to allow wayfarers use of the road with comfort and safety.

SQUARE LANTERNS.—This type of lantern has been in use on the roads in this country for so many years that they are automatically considered old-fashioned and very much out of date.

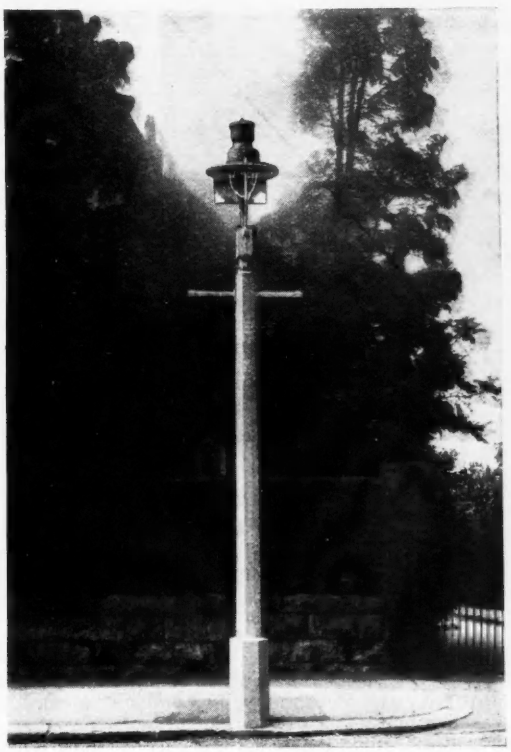
I am afraid I cannot agree with this opinion. Square lanterns, provided they are of sufficient capacity, and sited in accordance with modern requirements, can still perform an excellent job of work, and there are many installations erected within the last two or three years in several parts of the country which are giving complete satisfaction and providing extremely good illumination for a low cost.

An installation erected on a new road in Rothwell, York-

ISO-FOOT CANDLE DIAGRAM
ALPHA LAMP INSTALLATION-MORLEY



ISO-FOOT CANDLE DIAGRAM
SUPPORTED ARCTURUS INSTALLATION



shire, within the past four years gives a typical example of the effectiveness of this type of lamp. The installation provided and erected by the Rothwell Urban District Council consists of 3-light No. 1 size "Avil" square lanterns fitted with clock control and by-pass ignition; the lamps are mounted on concrete columns of neat design at a height of 14 ft. to light source and spaced in staggered formation at 30 yd. Distribution of the light source is effected by means of a Holophane ring, the roadway is 30 ft. wide, surfaced with tarmacadam.

I could quote many examples of excellent lighting schemes carried out by means of square lanterns, and I consider that there is still a large field of work which can be successfully carried out by this type of lamp.

Improvements to Existing Installations.

Many small local authorities have adopted the policy of systematically improving existing installations with a minimum of capital expenditure by increasing lamp capacities and providing modern reflecting or refracting apparatus and automatic control.

A recent example of this type of work carried out by one of our constituent companies was concerned with the reorganization of an installation of 2-light No. 2 size mantle, 16 in. square lanterns mounted on cast-iron columns at a height of 10 ft. 6 in. to light source. The lanterns were stripped and overhauled, and fitted with 3-light No. 2 size mantle superheater burners, stainless steel reflectors, and clock controllers incorporating automatic ignition. The columns were raised by the use of extension pieces to provide a mounting height of 14 ft. to light source, and although we were confined to the use of the existing number of lamps, alterations were made to the siting of the lamps and staggered formation was arranged where possible.

The savings effected in labour charges and gas consumption by the use of automatic control and modern high efficiency burner equipment, were sufficient to cover the cost of the increased light output and provide a substantial contribution to the interest charges on the capital expenditure involved.

I could cite many cases where gas lighted side road installations have been scrapped, which could quite easily have been modernized and improved to give lighting efficiency equal to the modern equipment which has replaced them, with considerable saving in capital expenditure to the authorities concerned.

The Ministry of Transport Report.

The Report was issued at a most opportune time, inasmuch as public notice has in the last two or three years been focused upon the problem of road safety. During this period the general public has taken a greater interest in road conditions, and it is my opinion that in the near future they will demand public lighting capable of ensuring the safety which they are being educated to expect.

The Report clearly indicates the line upon which we should work if we are to bring about the improvements in general standards of lighting which we all admit are extremely desirable. It has also brought many problems, which in my opinion require immediate consideration.

During the past seven months on no less than four occasions I have prepared schemes of lighting for small towns to conform to the Report; on consideration of cost the Authorities have been forced to admit that the schemes are far beyond the limit of their spending power, and on each occasion I have been compelled to submit modified schemes.

From my experience it is obvious that under present conditions many small towns can only view the Ministry of Transport's recommendations in respect of both Group A and B roads as an interesting publication on the aspects of public lighting applicable to their more fortunate neighbours.

As an example I would quote the case of a small Urban District Council in the West Riding of Yorkshire. Within their area they have no less than 16 miles of main traffic road, and of this total only three miles of road are scheduled to the Trunk Roads Act of 1936.

Group A lighting designed to give an output of 3,750 lumens per 100 ft. linear of road will cost in capital expenditure alone approximately £750 per mile, or an annual interest and sinking fund charge of £66 per annum. A penny rate in the area referred to yields a total sum of £55 per annum; therefore, to light the non-scheduled roads within the area to a minimum Class A standard, capital charges alone will require an additional rate of 1s. 3d.; of that total, approximately 7d. is required to pay for poles to give the standard 25 ft. mounting height.

A similar case arose in connexion with an enquiry we re-

ceived from a small village previously without light. As a result of the publication of the Report the Council decided that they would invite tenders for street lighting in accordance with the recommendations of the Report. The minimum scheme required a rate of 1s. 2d.; the ratepayers at a public meeting voted for lighting to a maximum rate of 3d.

I have found that, with a few exceptions, local authorities are more than anxious to improve the lighting on roads within their areas up to the full limit of their spending power, but it is quite obvious that some assistance must be provided for the majority of the small towns and villages in this country to enable them to enjoy the advantages and safety of modern standards of public lighting.

The most serious aspect of this problem is that where local authorities find themselves unable to adopt the recommendations contained in the Report, they become reluctant to undertake any improvements to their lighting, preferring to conserve their spending powers in the hope that at some future date assistance will be provided to enable them to adopt the Ministry's recommendations.

Maintenance and Service.

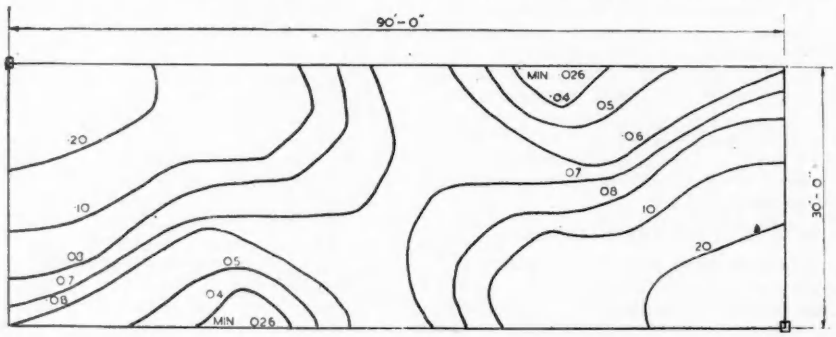
Gas as a source of public lighting is quite often considered out-of-date and unable to keep pace with modern requirements. It cannot be denied that this criticism is to some extent deserved, but the whole of the blame can be traced to the appalling lack of maintenance and true appreciation of the vital necessity of service. There is not the slightest doubt that gas can provide the lighting so vitally necessary for road safety. During the past 10 years intensive research has produced the equipment which can place gas in the front rank as a lighting medium. I would, however, sound one note of warning: given the finest equipment which engineering brains can devise, without efficient service and maintenance to maintain efficiency, the equipment can be rendered worse than useless.

The Gas Industry to-day realizes the vital necessity of service. We are no longer content to sell gas for lighting, but we are determined to sell a lighting service which we believe has many inherent advantages.

Maintenance of public lighting calls for skilled attention and supervision, whether it be lighted through the medium of gas or electricity. A number of speakers have dealt with this important problem from this platform, and indeed I believe that this Association was formed primarily to encourage Local Authorities to take over this important work.

Unfortunately a limited pocket can prove a barrier to good intentions, and the control of public lighting in many small towns and villages must of necessity be placed in the hands of officials who can only look upon this work as a spare time job.

Quite recently I had occasion to investigate the lighting



150 FOOT CANDLE DIAGRAM
SQUARE LANTERN INSTALLATION

position in a small seaside town. The equipment consisted of some 300 gas lamps. The whole of that installation was lighted and maintained by one man with the occasional assistance of a youth. My recommendation to that Authority was to place the whole of the responsibility for their lighting in the hands of the Gas Undertaking, and I would further suggest that the Authority should negotiate an agreement with a larger adjoining Authority for the assistance of its Public Lighting Engineer. This latter suggestion is made because I believe that a Local Authority should have at its disposal the advice and assistance of a trained official capable of supervising the efficiency of the lighting service which our Company will supply.

I suggest that there is a definite need for collaboration between local authorities on these lines; small authorities with a limited pocket could, with considerable advantage to themselves, obtain the assistance and advice of competent lighting engineers in the service of their more fortunate neighbours.

In the design of modern gas lamps, due regard is paid to the necessity of ease of maintenance and constancy of light output. Modern installations are provided with pressure governors and fixed injector orifices. Gas is supplied to the installation with a calorific value and specific gravity constant within small limits. These factors ensure a practically constant gas consumption and illumination of the mantle.

All these modern developments have assisted in reducing maintenance costs, and enable gas undertakings to offer extremely favourable guarantees. It has been proved that a very high standard of maintenance can be obtained at a

Housing Estate Lighting.

3-light No. 1 size mantle square lamp, fitted with stainless steel directional wing-type reflectors. Mounted at 15 ft. to mantles, spaced at 120 ft. (average) in staggered formation.

reasonable cost. It is also possible to safely guarantee to maintain gas lighting installations to within 20% of their initial values.

Automatic Ignition.

The development of automatic ignition has proved a considerable aid to service. It will be noted that in all the installations described in this Paper the Horstmann "Comet" type igniter is used in conjunction with their quick action clock controllers, and our experience with this type of igniter has been so satisfactory that its adoption is now standard. The advantages of automatic ignition may be stated as follows:

1. *Economy.*—It is usual to base by-pass consumption on a figure of approximately 0·25 cu.ft. of gas per hour. The "Comet" igniter uses not more than 1 cu.ft. of gas per season.
2. *Reliability.*—The igniter provides a very generous flame, and it is impossible for this to be blown out during the short time it is doing its work. The igniter is actually only emitting a flame for about 30 minutes per year, therefore the liability to choking is extremely remote.
3. *Reduced Costs.*—The increased reliability and the economies effected naturally reduce both gas and maintenance costs.

Light Actuated Control for Gas Lamps.

The Final Report of the Ministry of Transport Departmental Committee on Street Lighting recommends that street lighting should be continued during the hours of darkness and not as heretofore by a prearranged timetable. This is particularly important in respect of lighting for street refuges, road junctions and roundabouts, &c.

A recent development for gas street lighting purposes is the use of a photo-electric cell actuated control device arranged to light and extinguish the lamp at any predetermined density of daylight.

This apparatus* was devised by the South Metropolitan Gas Company for use in schools for children with defective sight, and has been adapted by them in conjunction with the Gas Light and Coke Company for use in connexion with the lighting and extinguishing of public street lamps.

The controller is built up from components which are in common use, comprising a photo-electric cell, a sensitive galvanometer relay fitted with maximum and minimum contacts, a 3-volt dry battery, and a spring motor actuated street lamp controller of the type normally used for gas lighting control, but fitted with an electro-magnet and the necessary contacts. The complete unit with the exception of the cell is included in an iron box of small dimensions, and, in use, is fitted in the main supply of the lighting installation; the cell can be placed in any suitable position.

The operation of the device is extremely simple; daylight falling on the sensitized surface of the photo-electric cell produces a current the magnitude of which depends primarily on the intensity of the light. The relay, operating on the principle of a moving coil galvanometer, is actuated by this current, and when the moving coil is deflected it carries with it a conductor which makes contact with one of two points depending upon the amount of current produced by the cell. This conductor completes a circuit and energizes by means of a dry battery a small electro-magnet, which attracts a simple iron armature, to which is attached the starting lever of the spring motor; this, in turn, operates the gas cock on the supply pipe. As soon as the gas cock operates in either the on or off position, the contact to the electro-magnet is broken and current ceases to flow from the battery, and at the same time changes over the contacts ready for the next operation when the movement of the relay conductor completes the circuit. By this means it is possible to supply all the energy for operating the device from a small 3-volt dry battery which will give many months of service. The attention required from the maintenance staff is, therefore, reduced to winding the spring of the motor, the frequency of which operation depends upon the number of times the gas cock is operated. The spring used actually requires rewinding after 150 operations of the gas cock.

The particular Council who first had this method of control installed was so pleased with its efficiency that several repeat orders have been placed with the manufacturers. The running costs of this apparatus are practically negligible, and I feel sure that its development will be welcomed by many Public Lighting Authorities.

Air Raid Precautions.

Without some definite guide from the expert authorities entrusted with this work it is impossible to budget for the regulations which will obviously be necessary in times of such emergency. Many authorities have formed the opinion that where gas is used as a source of light, prompt extinction in times of emergency cannot be effected. With the object of being to some extent prepared for any regulations which may be issued, gas appliance manufacturers have given some thought to the problem, and several cheap and efficient appliances have been developed, designed to effect prompt extinction of a gas light source in the event of emergency. The majority of these appliances consist of an extremely simple cut-off valve operated by either an increase or decrease in gas pressure. Provision is made for setting each individual unit to operate at the most suitable pressure so that any difficulty with regard to varying pressures at varying altitudes may be overcome. The most attractive feature of these precaution appliances is that once the actuating pressure difference has

* Patent No. 460155. Mr. W. B. H. Hall, Mr. R. H. Whillock, and the South Metropolitan Gas Company. ["JOURNAL" for April 15, 1936, p. 176.]

operated the valve it will remain closed until operated manually. Staff panic at the source of supply or any other action leading to further involuntary alterations to the pressure cannot affect or actuate the lighting service.

Conclusion.

I have endeavoured in this short Paper to deal with the aspects of gas lighting, with particular reference to small towns and villages. That gas for public lighting service is still a sound proposition was, I suggest, fully demonstrated at the last Conference of your Association. Research has not ceased since that date, and I confidently look forward to further progress in efficiency and service from gas as a medium of cheap lighting and an effective substitute for natural light.

M.o.T. Final Report on Street Lighting

Annual Conference, Bournemouth, Sept. 5 to 8.

A.P.L.E. Paper

by

J. F. COLQUHOUN

I.

When the Final Report was first published in November of last year, it was, on the whole, favourably received. Recently, however, some criticism has been voiced. When endeavours are made to carry out its recommendations, certain difficulties arise, and I assume that the intention of the Council of the Association of Public Lighting Engineers, in asking me to open a discussion on the Report, is to give yet another opportunity to its members of voicing their difficulties, and, by mutual exchange of views, to solve them.

Some of the criticism I have heard is reasonable, and some —well, not so reasonable. Critics assert that the Report fails in that it does not evaluate street lighting installations, because it does not provide a measuring-rod by which installations can be assessed with precision and weighed one installation against another. One critic has said plainly that the members of the Ministry of Transport Committee, in view of their failure to provide the desired yard-stick, have themselves been weighed in the balance and found wanting.

The terms of reference given to the Committee were "to examine and report what steps could be taken for securing more efficient and uniform street lighting, with particular reference to the convenience and safety of traffic, and with due regard to the requirements of residential and shopping areas, and to make recommendations."

There is nothing here about providing yard-sticks, and I feel that the Committee cannot be blamed for not doing what it was not asked to do. It probably did not occur to its members that they were expected to be auxiliaries to the sales technical staffs of manufacturers of street lighting plant, the designers of street lighting installations, and of the other somewhat heterogeneous collection of people who at present interest themselves, more or less, in the subject.

Could the Committee have provided such a yard-stick had they wished, and had they been asked to do so? The various editions of the British Standard Specification have never been accepted as infallible measures of the merits of installations. Indeed, the 1931 Specification clearly disclaims any such purpose. Table I. of the Specification, which gives the test point illumination for the various classes, has as a footnote, and in bold type, this sentence:

> "These classes are only used for reference purposes in this Specification, and do not necessarily represent the relative merits of the installations."

The many street lighting codes throughout the world do not pretend to be infallible guides, far less infallible measurements of the efficacy of installations.

II.

Paragraph 15 of the Final Report gives a list of the large number of organizations who were good enough to lay evidence before the Committee. Some of the evidence was conflicting, but there was a large measure of unanimity on most of the essentials. All our witnesses said that at the present time there is an unfortunate lack of uniformity of lighting throughout the country. Not only a want of uniformity in standards of illumination, but in the arrangement of the lamps, in their spacing, their power, their mounting height, &c., &c. This, we were told, was most confusing to motorists, who were constantly in doubt as to whether the street lighting provided enabled them, or was intended to enable them, to extinguish the headlights of their vehicles. They were constantly in doubt as to whether the lighting authorities providing the street lighting service expected motorists to drive with headlights full on, dipped, or extinguished.

It would have been easy to say that the standard of lighting to be provided in the future in *all* built-up areas should be such as to give visual safety without the use of headlights. Such advice would have been quite impracticable, and would have resulted, I fear, in nothing being done at all. Many schemes for the classification of roads were considered, but it was felt that the simplest classification was best, namely, that there should be two groups, in the first of which would be placed all such roads as could be called "Traffic Routes," and in the second group all other roads.

Traffic Routes Defined.

"Traffic Routes," in paragraph 26, is defined as including all those roads which form the main approaches to, or traverse important centres of population, or pass through detached built-up areas, and on which there is appreciable pedestrian traffic. Generally speaking, all those roads in built-up areas which are included in the Ministry of Transport system of classification, may eventually have to be regarded as "Traffic Routes," from the lighting point of view, together with such other roads as may be considered by the responsible authority to form principal arteries of the local highway system. The case is fully stated in paragraphs 18 to 27.

III.

Paragraph 21 states that the lighting of roads in the first group would be such as to render the use of headlights unnecessary in all circumstances, with the possible exception of fog. (Note in passing that there is no reservation of a speed limit.)

Paragraph 22 explains that the Committee regard it as a matter of first importance that the drivers should be free from uncertainty as to whether or not the street lighting is intended to be entirely adequate for their needs, and it was felt that there should be a definite gap between the two ranges of lighting, so that drivers in streets within the higher category would be in no doubt as to the use of headlights being unnecessary, and it follows that when drivers are in streets within the second group they would know that the lighting could not be relied upon as entirely adequate in all conditions, and that they would recognize that the onus was on them to use their headlights as and when circumstances require.

This distinction is brought about in two ways:

(1) The mounting height of the light sources.
(2) The quantity of light provided.

The mounting height of the sources for Traffic Routes

(25 ft.) was recommended in the Interim Report, and re-affirmed in the Final Report in paragraphs 31 to 34. The mounting height recommended is one which presents no practical difficulties in most cases. Exceptions, of course, there will be, but, generally speaking, 25 ft. is a height at which lighting units can be easily erected and maintained. It has been suggested that in the future we shall have still higher powered light sources available, and that with higher mounting than the 25 ft. recommended, and with wider spacing, equally good results could be attained with fewer lamps. I disagree with this view. If one places the lamps at greater distances apart than an average of 150 ft., the siting at bends, intersections, and junctions is likely to be jeopardized, or, alternatively, if the bends, junctions, and intersections are looked after properly, the spacing of the lamps on straight stretches is likely to be unduly large if the average spacing is to be much greater than 150 ft.

The mounting height of 25 ft. together with the quantity of light recommended in paragraph 54 does provide, if the other recommendations of the Report are carried out, what the Authors of the Report desire, and what was asked by all our witnesses—visual safety without the use of headlights on Traffic Routes.

I have been asked: "How are motorists to know when they are on a Traffic Route, whether the lighting is considered to be adequate?" It is inferred that the increased volume of light, the increased mounting height, and the increased visibility are not of themselves sufficient indications, and it is suggested that warning signs are necessary. Most motorists would deplore additional signs on our roads. Fortunately they are unnecessary, as I hope to show later by lantern slides.

With units mounted 25 ft. high, the roads present altogether a different appearance than when they are lighted by units 13 ft. or 15 ft. high. The higher mounting height, and the resulting better spread of light, has the effect of altering altogether the general appearance of the street, and this in addition to the better visibility.

IV.

Paragraph 54 tells us the quantity of light to be provided in Traffic Routes per 100 ft. linear of road, having a carriageway not more than 40 ft. in width. Please note that this quantity of light should *exceed* 3,000 lumens, and lie between this value and approximately 8,000 lumens per 100 linear ft.

I would specially direct attention to paragraph 53 of the Report. When the Report speaks of lumens, it refers to the total light output of the lantern, and paragraph 53 goes on:

> "But since controlled distribution of light emitted by the lanterns is necessary in order to obtain the best results it must not be inferred that the lantern which absorbs the least amount of light or that which has the largest total light output is necessarily the most effective."

It has been argued on this question of quantity of light to be provided that the limits of the two groups—*i.e.*, between 3,000 and 8,000 lumens for Traffic Routes, and 600 and 2,500 for other roads—are too wide, and that there should be sub-division in each. I most certainly disagree with this line of argument. Roads differ so much in their characteristics; the reflectivity of the road surface, the width of carriageways and footpaths, the possible reflection from buildings, fences, hoardings, &c., the volume of motor traffic and, of as great importance, the volume of pedestrian traffic, that only those familiar with the local conditions can say which standard of lighting within the two groups is appropriate. Had the Committee endeavoured to sub-divide, they would have added to the difficulties of the local authorities. Further, the advice tendered in the Interim Report that local authorities should be advised by a competent Lighting Engineer, is re-affirmed in the Final Report.

I have been told that this new value "lantern output in lumens" is not generally understood. To give efficiency figures of the light output of gas or electric lamps in these days of constantly increasing efficiency is a somewhat hazardous thing to do, but I am going to risk it. I do not expect that my figures will be accepted by everyone, but perhaps they will be confirmed or corrected in discussion.

Efficient low-pressure gas lanterns using 500 B.Th.U. gas should give between 160 and 200 lumens per cu.ft. of gas consumed; high-pressure lanterns between 280 and 300 lumens per cu.ft. consumed. It is fairly safe to take the specified light output over life of electric lamps, and deduct, say, 30% for absorption of reflectors and/or refractors.

V.

Before we discuss the Report in detail, may we consider what would be the effect of its universal adoption throughout the country. All Traffic Routes lighted with units mounted at or about 25 ft. high, the power of the light sources such as to give the quantity of light employed somewhere between 3,000 and 8,000 lumens per 100 linear ft. on roads with a carriageway of not more than 40 ft. in width, the resultant visibility such as to give visual safety without the use of headlights, and to give it in such good measure as to leave no doubt in the minds of all motorists as to what is the purpose and intention of the authority providing the lighting.

All other roads lighted with units 13 ft. to 15 ft. high, the quantity of light provided between 600 and 2,500 lumens per 100 linear ft., the resultant visibility such as to render the use of headlights unnecessary to many drivers familiar with the local conditions, but, nevertheless, because of the low mounting height and the lesser quantity of light employed, clearly indicating that the lighting could not be relied upon as entirely adequate under all conditions. All reasonable motorists would then recognize that the onus was on them as to whether they did or did not use headlights, and that it was not the purpose and intention of the local authority responsible for the installation to provide lighting of such a high standard as to give visual safety in all circumstances.

Is it a desirable thing that all lighting throughout the length and breadth of the land should conform to this picture? On the answer to this question will depend very much our attitude of mind in considering the more detailed recommendations of the Report.

VI.

Spacing: Traffic Routes.

Having decided the mounting height, we must make up our minds as to the distance between the lamps. Paragraph 35 recommends 120 ft. on straight stretches where economically practicable. An average spacing of 150 ft. should not be exceeded, and, if by reason of junctions and intersections this spacing has to be departed from, 180 ft. is the maximum for any one span. It is clear from the paragraph that spacings greater than 150 ft. are intended to be exceptional. Those of us who have the planning of street lighting know how much easier it is to deal with junctions, intersections, and irregularities of road formation if the spacing is fairly close. Further, close spacing has an important bearing on the elimination of glare.

Overhang: Traffic Routes.

In the Interim Report an overhang of the kerb of 6 ft. was recommended. It has been modified in the Final Report. Paragraph 36 states that the maximum distance between the two rows of sources should not exceed 30 ft. if a dark centre of the road is to be avoided. On a road with a carriageway of 40 ft. the overhang of the kerbs would, therefore, be 5 ft. The paragraph adds that the maximum overhang which can be provided without causing the visibility on the kerbs to suffer unduly is about 6 ft.

Paragraph 37 points out that if the carriageway width exceeds 50 ft., central lamps, in addition to the lamps at the side of the road, are essential.

Siting: Traffic Routes.

There was some conflict of evidence on the siting of lamps. Some witnesses expressed a preference for central suspension, but most witnesses disagreed. It was stated, for example, that central suspension rendered it difficult to provide adequate visibility near the kerb and on the footway, especially on wet roads, and that it induced traffic to keep to the crown of the road. All witnesses agreed that confining the lamps to one side of the road on straight stretches results in defective lighting.

Paragraph 40 states that the question of central suspension

is obviously bound up with the width of the road, and with conditions on the sides—the presence of buildings and trees. It is clear that in the case of non-cut-off fittings there are inherent disadvantages in the central suspension system.

With regard to the "cut-off" type of fitting, the Committee remark in the last sentence of paragraph 40 that they do not desire to say anything to prejudice the use of such fittings with either central or combined central and side mounting until such time as experience has shown whether the disadvantages previously mentioned are important, also when the "cut-off" types are used.

The staggered arrangement is, however, recommended as the most suitable for general adoption on straight roads, and the Committee is satisfied that this arrangement is capable of giving satisfactory results, provided the mounting height, spacing, and overhang are in accordance with the recommendations of the Report.

Lighting at Curves and Bends.

Paragraphs 45 to 47 deal with the positioning of lamps at curves and bends.

It is said that paragraph 46 is not precise enough in its recommendations, and that further guidance is necessary. For greater precision I fear we must await the publication of the British Standard Specification. Differences in local conditions, and differences in road formation, make it quite impossible to lay down few and simple rules.

Paragraph 48 points out that the guiding principle in all questions of siting is that there should be a light source in such a position as to produce a bright background to any object with which the driver may be concerned. If we apply this principle, we shall so place our lamps that there are always sources beyond all those parts of the carriageways which form important backgrounds. If we do this, lamps shall not appear to be so widely separated when viewed by a driver using the carriageway that large dark regions are formed between the lamps. To get these results it is recommended that lamps should usually be placed on the outside of the curve, and without endeavouring to forecast what the Specification may require in this respect, I make the tentative suggestion that when the light sources are mounted 25 ft. high, and about 200 ft. from the observer, the angle of separation should not be greater than 3·5°; when the sources are about 500 ft. from the observer, the angle of separation should be less than 1°, and when 700 ft. distant, about ½°. When light sources are mounted 13 ft. to 15 ft. high, the angles of separation will be less than those quoted above.

Critics have pointed out that strict adherence to the recommendation of paragraph 46 would, on sharp bends, bring the lamps abnormally close together. I agree, and suggest that a spacing closer than, say, 60 ft. should not be insisted upon.

As the siting of lamps must be closer at bends and intersections than the average of 120 ft. or 150 ft., the spacing will in some cases be somewhat irregular, and the interesting question is asked "Should the power of the light sources be graded so that the luminous output per 100 ft. linear would be more or less constant?"

There is nothing in the Report to prevent this grading, but, personally, I do not like the suggestion. Lamps are placed closer at bends and intersections because the circumstances demand it, and the additional volume of light, because of the closer spacing, is all to the good.

Paragraph 48 tells us that where two Traffic Routes cross at right angles there should be a source on the left-hand side of the road just beyond, but not too close to the intersection. This has been criticized as indefinite. For more precise guidance we must again await the Standard Specification. I have found that the desired effect is obtained if the sources mounted 25 ft. high are placed not more than 40 ft. from the intersection of the lines of the nearest kerbs—*i.e.*, the kerbs of the intersecting road—and if the distance between the lamps at the junction is not more than 120 ft.

If the intersecting roads are not straight, or do not cross at right angles, or where there are any other irregularities, the siting requires, of course, to be varied to suit the conditions applying at the particular junction. Please note that the paragraph refers to two *Traffic Routes*.

A further recommendation in paragraph 48 is that in the case of an ordinary "T" junction, as where a side road enters a main road, a lamp should be placed in the main road immediately opposite the side road. The Report says "should *invariably* be placed," but this, of course, is impossible. Nevertheless, it is advice which should be followed where at all possible.

Lighting of Roundabouts.

It is impossible to lay down rules which can be universally applied because roundabouts vary so much:

(1) In their formation.
(2) In their dimensions.
(3) In the angles with which approach roads converge on the area of the roundabout.
(4) In the reflection and other characteristics of the surroundings.

Great care is necessary when siting the lamps to ensure that they are not so placed as to tend to guide drivers *across* the centre island rather than round it.

The last sentence of paragraph 48 advises that at roundabouts sources should be so placed that the kerbs are clearly defined to drivers, and paragraph 49 says that it is important to ensure that sources are so sited as to indicate clearly by their positions, as far as possible, the course of the track ahead.

If we apply these principles to the lighting of roundabouts it is clear that sources must be placed on the central island. If the island is a large one, the units must be mounted near the kerbs, and in such a position that a light source is visible for a considerable distance to on-coming traffic. The position of the lamp should be in line with the track into the roundabout. The same guiding principles apply in siting the lamps at the ends of the road leaving the roundabout.

Distribution.

On the question of distribution of light output, the Report most wisely refrains from attempting to make definite recommendations. Indeed, in paragraph 56 the Committee state that it may appear, as a result of further experience, that there is no one type of distribution which is best in all circumstances, bearing in mind the varying conditions encountered in practice, more especially in respect of the nature of the surfaces to be lighted. It does say, however, in paragraph 57, that in practice it is usually found that with a "cut-off," or similar distribution, closer spacing is required, as compared with the alternative type in order that the production of dark patches on the road may be avoided.

Glare.

Paragraphs 59 to 64 deal with the vexed question of glare. An attempt is made—perhaps a somewhat empirical one—but still, an attempt is made to limit the amount of glare by a limitation of the intensity of the main beam. Our witnesses were unanimous in condemning the practice of endeavouring to make up for a far too large spacing-height ratio by using a type of fitting which sends out a highly concentrated beam of light at angles close to the horizontal. There seems to be complete unanimity of opinion that long spacing and high concentration of the main beam were two evils which do not cancel out.

VII.

Effect of the Nature and Condition of the Road Surface.

I would like to direct the special attention of road makers to paragraphs 65 to 68, which deal with the effect of the nature and condition of the road surface. Paragraph 68 points out that it is difficult to light satisfactorily a road surface which exhibits variations of colour and texture, and it is, therefore, desirable that a surface should be provided and maintained which is as uniform as possible in these respects. It is further pointed out that the provision of light coloured kerbs is helpful from a lighting point of view.

It is impossible to give a uniform background brightness against which objects can be seen if the road surface itself is not uniform. We all know the matt roads with shiny patches, and the shiny roads with matt patches. No system of street lighting can "iron" out those patches. They are most confusing to the road user. It is to be hoped that road engineers will pay special attention to paragraph 68.

VIII.

Dual Carriageways.

The lighting of dual carriageways is dealt with in paragraphs 69 to 73.

In paragraph 70 the Committee point out that there has been marked development in the provision of dual carriageways in this country, and that the Lighting Engineer is faced with a type of problem different from those with which he has hitherto been concerned. It is felt that the limited experience of the lighting in such carriageways does not permit of definite recommendations being made, but in paragraph 71 the tentative recommendation is put forward that dual carriageways should be lighted as separate Traffic Routes, and that if this is done satisfactory results will be attained.

The memorandum on the lay-out and construction of roads (Memorandum 483—Roads) states that the separation of dual carriageways should be effected by a reservation of the greatest width practicable. Endeavour should be made to secure a width of 26 ft. between dual carriageways of 20 ft. and not less than 6 ft. between dual carriageways of 30 ft.

There are, however, already in existence many dual carriageways with reservations less than 6 ft. wide, and paragraph 71 of the Report does say that if the central reservation is narrow, it may be desirable to employ a single row of units mounted centrally along the reservation forming, in conjunction with the sources along the outer kerbs, a staggered arrangement on each carriageway.

In view of the above, I submit for discussion the following:

Where the carriageways are more than 30 ft. in width, or where the central reservation is more than, say, 10 ft. in width, each carriageway should be lighted independently.

Where the carriageway is 30 ft. or less in width, and where the central reservation is 10 ft. or less in width, lanterns mounted over the central reservation may be considered as contributing to the lighting of both carriageways, and I feel that it is in keeping with the spirit of the Report if the full light output of these lanterns in the central reservation is included for both carriageways in the calculation for lumens per 100 linear ft.

Unless the dual carriageways are separated by a fairly wide reservation, I should say over 10 ft., the lamps erected on the reservation may become confusing to the users of the road. I do know that in some cases dual carriageways are being lighted by too many lamps. I would not say they are overlighted, but the multiplicity of light sources results in confusion in the mind of the driver as to the direction of the carriageway. I suggest, therefore, that, where at all possible, one lamp in the central reservation should give service to both carriageways, and I think this could quite well be done if the central reservation is not more than 10 ft. wide, and the dual carriageways of normal width—*i.e.*, about 30 ft.

IX.

Lighting of Group "B" Roads.

The general rules applying to the lighting of Traffic Routes apply also to the lighting of residential roads. The essential requirements are enumerated in paragraph 77, while paragraph 76 deprecates expenditure on spectacular lighting of Traffic Routes until reasonably satisfactory lighting has been provided in Group "B" roads.

The mounting height recommended is 13 ft. to 15 ft. with a preference for 15 ft.; the average spacing not more than 120 ft., and preferably 100 ft., and the quantity of light recommended per 100 ft. linear is over 600 lumens, and between that value and 2,500 lumens.

X.

Maintenance.

The Committee hold the view that satisfactory maintenance is of no less importance than correct design, and they say so clearly in paragraph 89. The view is expressed in paragraph 90 that illumination measurements by virtue of their relative simplicity provide a practicable means of assessing the state of maintenance. You may well ask what is "relative simplicity," because there is no doubt that the checking of maintenance by illumination measurements is by no means simple. One of the great difficulties is that light sources do not all deteriorate uniformly over their effective life, and at the same ratio of deterioration, one source as compared with another. It is impossible to take the necessary number of readings for an installation immediately that installation is brought into use. There must be some time allowed for adjustment, and for the general tuning-up of the installation. Some time must elapse between the bringing of the installation into use and the completion of what one might call the initial illumination tests, and during that time the light output of the lanterns is falling, and falling more rapidly with some sources than with others, and more rapidly than will apply later on in their life.

The daylight appearance of the street lighting plant should be kept in mind, and in my view lanterns should be cleaned sufficiently often to ensure that they present a good daylight appearance, irrespective altogether of the absorption of light through soiling and the consequent diminution of their effectiveness as lighting agents. Inspection should be made from time to time to make certain that light sources are in their correct positions in relation to any re-directive devices employed. The setting of reflectors and/or refractors should be inspected periodically, and adjustments made where necessary. Gas burners should be cleaned frequently, and electric lamps should not be allowed to burn beyond their useful life.

It should be possible for photometric measurements to be made within a comparatively few hours of an installation being brought into use, say, between 75 and 125 burning hours, and the values thus obtained compared from time to time with readings taken under "service" conditions. In my view every lamp should be checked as to its light output and the setting of re-directive equipment so that the test points of the old British Standard Specification will not do. Positions nearer the lamps could be taken. I profess a preference for the test plate of the photometer being placed normal to the light. No doubt there will be mandatory clauses in the new Specification relating to maintenance.

It is stated in paragraph 117 that the Report is not intended as a Specification, and the view is expressed that the recommendations made should be implemented, with a minimum of delay, by the issue of a formal B.S. Specification.

One final word about administration. It is recommended (paragraph 4) that consideration should be given to the responsibility for the lighting of classified roads being confined to large administrative units, and attention is drawn to the suggestion that grants should be provided from National Funds towards the cost of lighting Traffic Routes upon which public lighting may be regarded as necessary.

The view expressed in the Interim Report is repeated in paragraph 11 of the Final Report, that the Committee concerned with street lighting should be advised by an engineer competent to deal with the problems which arise.

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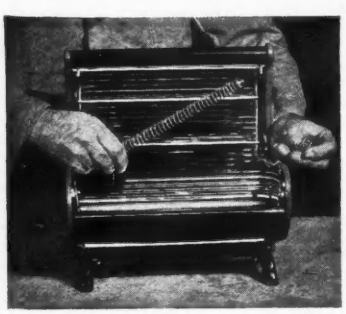

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Air-Raid Precautions and Lighting

by

THOMAS WILKIE

At the present moment, no one will deny that this subject is what the Press would call " hot news " and, in my opinion, a frank discussion thereon will be of great value to my fellow-members and also, possibly, to those in higher authority. Most of the factors concerned in what might be termed, in a general way, the Home Defences, are physical and, taken as a whole, will react in a normal and predetermined manner to a given set of circumstances. For instance, the damage one might expect from, say, incendiary bombs can be fairly accurately calculated, and provision can be made for dealing with that damage. Likewise, methods for ameliorating suffering caused by gas bombs can be readily devised. But lighting is, actually and psychologically, abstract; it can definitely be the cause of danger from the air, yet even when absent that danger is not automatically removed.

At the very outset, I would like to make it perfectly clear beyond any possible doubt that opinions expressed in this Paper are personal to myself; they are not necessarily the views of this Association, nor of my employers; nor have they, by imputation or request, the approval of either the Home Office or the Air Raids Department thereof. Nevertheless, I feel that some of the points which I am raising will, sooner or later, require to be considered.

The object of the Paper is to set down reasons, as I see them, why a state of continuous darkness cannot be looked upon with equanimity; a state of darkness was accepted in the late War as inevitable, but we have travelled far, scientifically, since then. We have now at our disposal means of satisfying the military needs of the country, and, at the same time, the means of reducing the inevitable " discomfort " of protracted periods of darkness. The method of achieving this is by means of some type of control system, of which there are quite a few. I feel that it should be possible to entrust this important control of lighting to one, or more, of these systems. The use of an approved system would also be of great value to A.R.P. schemes generally because, as far as I know, most of the systems at present available are capable of being used for actual A.R.P. work, such as calling out fire wardens, street wardens, &c. I refer to this aspect later in the Paper.

In setting out to prepare a Paper of this nature, and to submit it to a public meeting, I realize how easy it would be for me to be misunderstood. I might be accused of dealing with only one aspect of a very big and vital subject and of not carrying to its logical conclusion the method I am advocating. It might be said that the Home Office, in its wisdom and after careful consideration, has issued the necessary instructions for our guidance, and that any attempt to alter or relax these instructions would be rendering a disservice to the country. It might also be said that I am belittling the value of the Leicester experiments of driving in a darkened city. I would assure my listeners that the only motive behind the Paper is to suggest points which may not have been considered by those in authority. I am not financially or commercially interested to the slightest extent in any particular system of control, and I trust that any discussion on the Paper will not take place round the merits or demerits of any particular system, but on the advisability or otherwise of the principle of control which would permit street lighting between raids.

After all, war is war and, viewed from any angle, is distasteful and inevitably brings suffering in its wake, although not necessarily and solely bodily suffering. It is impossible to devise means of completely avoiding suffering, but I am firmly of opinion that the provision of lighting during non-raid periods will make a quite considerable contribution towards reducing the rigours of war. This could be called a compromise, but I might be told there can be no compromise on this subject, and that the danger of lighting, of any kind, is too great to contemplate. Or, it will probably be said that the efficiency of mechanical control gear is not high enough to be trusted; personally, I cannot believe that it is impossible to obtain the necessary efficiency in control gear. In my opinion, there is a clamant need of serious search for the perfect control system.

Before dealing with the general aspect of my Paper, it will probably be of interest to my fellow-members if I refer to the official black-out which was organized by the Home Office in my own city, Leicester, early this year. I will first of all refer to the arrangements made, as far as public lighting was concerned, to achieve a complete black-out and later to the lessons learned therefrom.

The experiment was not intended to ascertain in how short a period a large city could be darkened (although, in order not to dislocate traffic longer than was absolutely necessary, it had to be achieved expeditiously), but rather, having achieved darkness, to test methods of aiding movement of essential traffic in these darkened streets.

The zero hour was 1 a.m. on Jan. 28 last, and the exercise lasted till 3 a.m. There was no moon (hence the choice of date), and during the first hour the weather was dry, with very slight haze, but about 2 a.m. rain commenced to fall, making conditions for driving far from pleasant. Actually, the rain proved of value since it gave those taking part in the exercise two complete sets of conditions.

Certain streets in the centre of the city were chosen for the actual driving exercise and, with the valuable assistance of some 200 special constables, all traffic entering the city was diverted from these test roads by pre-arranged routes. All my listeners will realize the impossibility of instantaneous extinguishment of public lighting (that is, under existing and generally prevailing conditions), and the time taken to darken Leicester was between 1¼ and 1½ hours, which period, speaking in terms of A.R.P., must be ruled out of practical politics. But more of that later.

The arrangements made were as follows:

Hand-lit Gas Lamps.

Each lamplighter, knowing exactly the time he normally took to extinguish his beat, was ordered to commence to extinguish at such a time as would ensure that his last lamp would be dealt with by 12.45 a.m. After the exercise, at 3 a.m., all lamps were relit.

Controllers and Time Switches.

This was more difficult, and the time by which lamps must be extinguished was reduced to 12.30 a.m. to allow for hurried and inaccurate re-setting. Two full days prior to the black-out, each attendant commenced to re-set every third lamp to extinguish at 12.30 a.m., the following day he re-set another third, and on the last day (the day of the experiment) he re-set the last third. After 3 a.m. the last day's lamps were brought in by hand and re-set for normal extinguishing during the following day. The remaining lamps were re-set as soon as possible.

Main Roads (Tramway Routes).

By means of my own system of control (which in a way was under trial) most of the main road lamps were extinguished from the head office in 6 seconds. To be perfectly truthful, I must confess that one contactor behaved very badly and did not disconnect for 10 minutes. (This defect affected only a very small portion of one of the test roads for that period.) " Keep Left " bollards, one-way signs, &c., and similar units not controlled from the head office were in-

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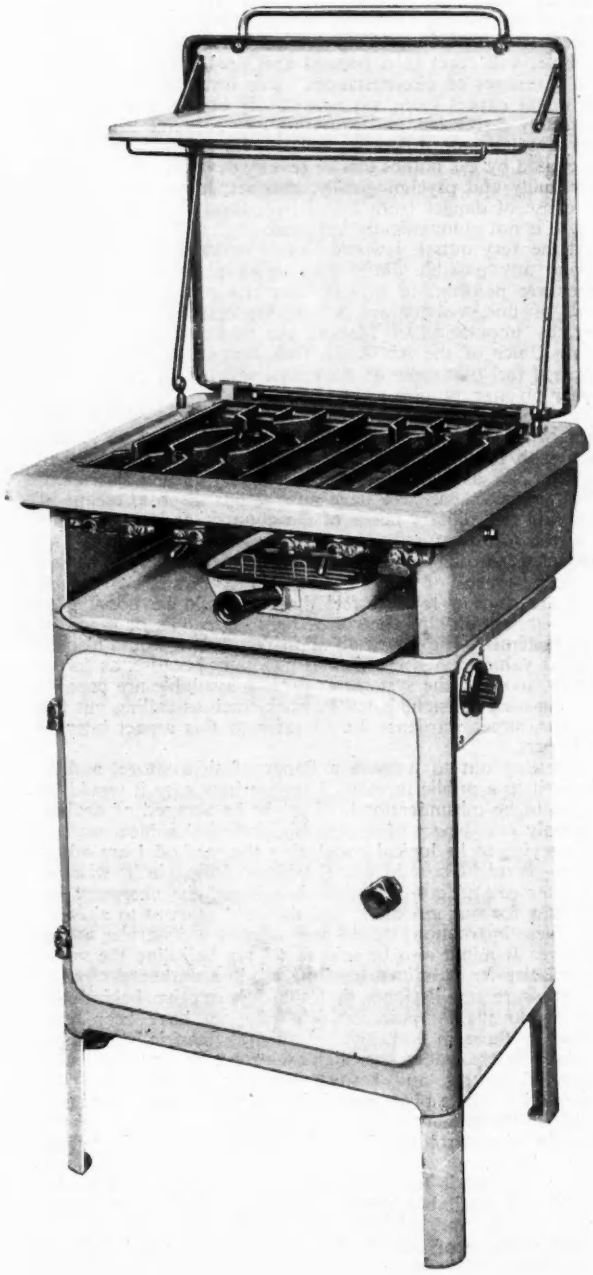


No. 17 In off-white and green porcelain enamel. Hotplate 22″ wide 20″ deep, with three Boiling Burners and double high Speed Grill. Oven 17″ wide.

The New FLAVEL Gas Cooker

dividually re-set on the day of the exercise. At each island the normal "Keep Left" signs were darkened, and hurricane lamps, with specially made spill shields, were placed. These islands were, of course, not within the roads under test.

It was necessary to keep alight certain equipment on the roads under test, and these were treated as follows. (I am omitting any reference to the tests, carried out previous to the exercise, to ascertain the intensity which could safely be used, having regard to both "aerial" safety and "traffic" safety.)

Light Traffic Signals.

Ordinary intensities were retained, but each lens was covered, in a few cases by metal discs, and in others by impenetrable black paper. In spite of the tremendously reduced area showing to traffic, there was not a single vote cast against this treatment. In fact, some drivers said there was too much light, but this was undoubtedly due to the exceedingly black and, to them, unusual background. Actually, these discs were used for a short period in full lighting, and motorists did not appear to be in any doubt as to which signal was in operation.

The Leicester experiment could be challenged on four grounds:

(1) Every driver was thoroughly acquainted with the test route, indeed he had made himself specially familiar with it.
(2) He knew the various road-markings beforehand.
(3) There were no pedestrians using the streets under test. (This is of the first importance.)
(4) He was accompanied by an observer who also assisted in navigation.

Or, put more briefly, the experiment might be compared with a test carried out in a laboratory, with practically all factors under control, and a test carried out "in the street."

I do not intend to belittle the value of the test, but I feel that considerably more thought must still be given to the subject. Much more assistance must be given to drivers (many of whom will be strangers) before I personally will feel satisfied that the driving conditions of our experimental night can be regarded as anything like the final conditions which will be universally accepted as safe.

From fact to conjecture—not pure conjecture but rather what conditions might, or should, be if this country is ever faced with war. I realize to the full that my opinions are very personal to myself, but they are not revolutionary. On many points they are no doubt at variance with the opinions of persons in authority but in agreement with the "man in the street," that omniscient person who will not be ignored.

Home Office Circular, dated Feb. 14, 1938, indicates the measure of lighting restrictions which will be enforced during an emergency, but I am dealing mainly with street-lighting here. The actual paragraphs are as follows:

> "Normal street-lighting would not be permitted in time of war.
>
> "Adequate means of aiding movement in darkened streets would accordingly be required in all streets likely to carry considerable traffic. Reflectors, white markings, or dim, well-screened indicator lights which cast no appreciable illumination but served merely to show their position would be used to mark the line of the road and also obstructions and danger points. More precise particulars of 'aids to movement' of this kind will be supplied as soon as possible.
>
> "Traffic control signals, fitted with approved masking devices, would be allowed to remain in operation in darkened streets.
>
> "It is not thought that further experience will reveal the need for any modification of these proposals. If any relaxation were found to be necessary, it would not go beyond permitting between raids a certain amount of modified street-lighting, carefully screened and capable of being instantly extinguished on receipt of an air raid warning, in the main thoroughfares of the largest towns, and then probably only in the less exposed parts of the country."

Personally, I do not agree that continuous darkness is necessary, even in the more exposed parts of the country. It is universally realized that Home Defence is a big and complex subject; indeed, it is probably the most vital subject at the present time, and decisions arrived at will have far-reaching consequences. Nevertheless, I feel that the lighting aspect has not been given the consideration it merits, nor the same consideration which has been given to other aspects, and the above Circular, in my opinion, represents the easiest method of dealing with it, by simply saying there shall be no street-lighting. This, while possibly satisfying military needs, does not pay any heed to the morale requirements of the vast civilian population.

The statement in the first paragraph of the Home Office Circular, that normal street-lighting would not be permitted, is very definite, and the permissive clause in the last paragraph is likely to be sparingly applied. Even so, the permissive clause makes it necessary to have some sort of control system and if that system is efficient enough to be operated in a few accepted cases it can surely be permitted throughout the country.

The Circular indicates that no known system is good enough to be generally entrusted with the control of street-lighting, but I feel that it is not impossible to find, or devise, an acceptable system. The idea behind lighting restrictions is, of course, safety, but there are many factors which will largely negative the value of these restrictions, and I make mention of these in the following paragraphs.

My case is that every endeavour should be made to find an acceptable system and that lighting should be allowed during normal dark hours and that, when a raid is imminent, all lighting should be extinguished until the "all-clear" is given, when lighting should be restored. I am naturally assuming that our Home Defence system would be capable of giving Local Authorities reasonable notice of the imminence of raids and of dealing with these raiders, at any rate, capable of preventing raids in relays, and of preventing the return of enemy raiders to their homeland.

The following, therefore, are the reasons leading up to my viewpoint.

Precision of Night-Flying.

During the late war target precision was extraordinarily good and, if one allows for the great improvement which has taken place since the War, it can safely be assumed that that precision to-day is still greater. In short, I submit that it is not necessary to give a modern pilot direction signs to make his mission successful, and that even in darkness his precision would be of a very high order. There are very many good reasons why figures of this precision should not be published.

Purpose of Air Raids.

The purpose of air raids over areas which are not actually the location of military operations (and one would expect that the British Isles is unlikely to fall into this category) can, I think, be assumed to be either

(*a*) To dislocate or destroy works of national importance, or
(*b*) To destroy civilian morale.

In the case of (*a*) it is necessary, I agree, to make them as inconspicuous as possible, but I am not certain that this can be done in every case. By the very nature of their operations, which must be carried on at all costs, the conditions it is sought to avoid would be likely to be created by these necessary works. In the case of (*b*) I am instancing the case of cities, towns, &c., which are not adjacent to works mentioned in (*a*) and which do not contain anything likely to be of value to an enemy. These latter represent a very high percentage of inhabited areas. In such areas, I submit, the only reason for air raids is to destroy civilian morale and, therefore, target precision (such as would be expected if the target was, say, a Munition Factory) is unnecessary. The result to the enemy would be practically the same whether a bomb fell in the heart of a city or in the suburbs. This may seem rather a blunt and unfeeling way to express the matter, but the point I am trying to make is that the two purposes are entirely dissimilar and that in (*b*) target precision can even be very indifferent and yet be effective.

Vulnerability of London, &c.

The defence of the British Isles presents a most difficult problem. The sea-coast round the British Isles (excluding Ireland) is approximately 4,650 miles and more than half of

this is open to attack from the most likely direction. Along this seaboard are many large and important cities, such as London, Portsmouth, Plymouth, Hull, Aberdeen, &c., which are much more raid-prone than inland cities; more raid-prone purely and simply because of their geographical positions. I think it follows, therefore, that separate schemes of defence should be adopted for such places. As regards lighting, a case could no doubt be made out for complete continuous darkness in the East Coastal areas, but I do not think such drastic restrictions should be made to apply *automatically* to inland and West Coastal areas. Likewise there are many cities which, even in complete darkness (an impossibility), would still be easily found by virtue of their proximity to rivers—*e.g.*, London with the Thames leading to the very steps of Westminster.

Furnaces and Munition Works, &c.

If it is accepted that a state of universal darkness is necessary this will, almost inevitably, be rendered negative by such works. These works will be difficult to screen, in terms of the lighting restrictions, and yet, as I said before, they represent a great national activity which must be carried on regardless of anything and everything.

Incendiary Bombs.

These represent another agency which will work against the safety which it is hoped to create by the imposition of drastic lighting restrictions. This point is so obvious that I do not propose to labour it unduly. A modern raider will carry up to 1,000 bombs, and even if only a very small percentage find a mark the result would be such as to immediately negative the value of darkness. The number of fires started would be in direct ratio to the number of raiders, and the value of the fires (to the enemy) would be to leave indisputable targets for further relays of raiders.

There are no doubt other arguments which could be brought forward, but the following points indicate advantages which would accrue if lighting could be brought in after a raid.

Darkening and Re-Lighting.

The present accepted method of warning civilians that an air raid is imminent is by the use of sirens, but I consider that the very act of darkening a city would be an extremely useful and effective auxiliary to the sirens. Indeed, by the use of certain control systems householders, &c., could be automatically warned, in their own homes, simultaneously with the darkening of streets. But the act of re-lighting, when the "all-clear" is given, would be invaluable, among other things, in restoring the morale of inhabitants. This, in my opinion, is of the very first importance.

After a Raid.

If lighting could be restored when the "all-clear" is given the painful, yet very necessary, work of amelioration would be rendered much more expedient and, therefore, more effective. Lighting of some sort would be absolutely necessary for rescue work, decontamination, &c., but this lighting, under present conditions, would be portable, and portable lighting, I consider, should be reduced to a minimum. Again, the restoration of lighting would be of tremendous value to fire brigades and ambulances. In both cases, loss of time in getting to a locus may well mean loss of life, and, frankly, I cannot visualize this sort of vehicle, bent on missions of mercy, driving along unlit roads using the emergency car lighting of the recent Leicester experiment, having to make all possible speed and at the same time take notice of pedestrians who would be hastening, if not scrambling, to places of shelter. These conditions would inevitably take place.

Crime.

During a prolonged period of darkness it would be difficult, if not impossible, to control crime in its various forms, and burglary and shop-breaking, if nothing more serious, would be rampant. Furthermore, the normally high efficiency of the peace-time Police could not be maintained during a period of war, and this of itself, quite apart from darkness, would make crime more "profitable" and less easy to check.

General Objections to Darkness.

Apart from what I might be permitted to call the more concrete objections to darkness, there are several others which, in my opinion, add their voices. These obviously have no reference to periods of raids but to the period of continuous darkness, possibly quite a long period as in the late war.

Nearly a quarter of a century has elapsed since the Great War and I submit that the conditions of our communal life have changed much in that period. It should not necessarily be accepted automatically that the then war-time measures would be as effective (if they were effective) now as then, and this applies very definitely to lighting.

Our social habits have altered considerably in many ways since the late War. We go out at nights very much more now, due to the popularity of the cinema, the comfort of the modern car, and to other factors. People would not stay indoors and there would consequently be a greater number of pedestrians mixing with vehicular traffic. (I would reiterate that this pedestrian aspect was entirely absent from the Leicester experiments.) Another reason for presuming that the pedestrian problem would be greater now than in 1914-18 is that the country population is steadily coming to cities and towns—it is a matter of fact that the population of cities, &c., is increasing and that of rural areas decreasing.

The speed, size, and power of modern cars, lorries, and omnibuses are other important factors in the changed conditions. Wider roads are also a contributing factor. Even in good artificial lighting it takes a good deal of sharp-sightedness, not to mention agility, safely to cross modern roads, and I ask you to picture these conditions of no street-lighting and heavily shrouded car lamps. Standards of artificial lighting have altered, being now considerably higher than ever before, and we have got used to these higher standards and would feel correspondingly less placid in darkness.

The same Home Office Circular deals also with the lighting of "private houses, shops, business premises, and places of entertainment." As I see it the efficacy of these restrictions is bound to be considerably less than 100%. Likewise in the cases of factories and industrial premises (also mentioned in this Circular) where exemptions are provided for. These would certainly do much to cancel out the value of street-darkening. Again I return to the control system and repeat a former point, which is no doubt known to most of you, that with certain systems of control *every* light in houses, shops, factories, &c., could be so equipped that they would automatically be extinguished on necessity.

This leads me towards the close of my Paper and to the real point thereof. I give it as my opinion that the vital need of the moment, from every point of view, is for a system, or principle, of control which would be sufficiently efficient to satisfy those who are in authority. As I have said before, there are many systems available at the present time, some of which have been in practical operation for quite a long time. If these known systems are not perfect enough to ensure complete and reliable control, further examination and experiment should be proceeded with. The initiative should be taken by the Home Office. With the science, ability, and resources available in this country, there does not appear to be any doubt that an acceptable system can be devised, if it has not already been devised.

Some such system is not only very desirable but necessary. It is highly probable that the next war will be upon us without any formal declaration and, in all likelihood, will be rapidly decided. The first notification that a state of war exists might well be the dropping of bombs. Without a control system it will be quite impossible to darken a city in less than six hours (and this is a conservative estimate), a period which is very unpleasant to contemplate.

I propose for a few moments to assume that a state has been reached which permits, if not specifies, a certain control system, or principle, and to enumerate the advantages thereof, in peace as well as in war.

It is a commonplace that more attention is being paid to street-lighting to-day than ever before. Much of this activity has been created by the publication of the Final Report of

the Departmental Committee on Street Lighting, and local authorities throughout the country are taking this publication very seriously and are improving, or considering the improvement of, lighting in their areas. This activity will continue for a long time. Considerable numbers of additional lamps are being erected and a large percentage of these will be equipped with the usual time-switch and will be unable to be extinguished in an emergency except by hand. If, however, a control system was used, all new installations could be initially equipped with the means of instantaneous extinguishment. The peace time labour costs of operating such a scheme would be considerably lower than the normal method; in fact, would present a sound financial proposition. It would also, of course, allow lamps to be brought in at will in the event of sudden fog, &c.

The above indicates very briefly the advantages during peace time, but the real advantages would be in war time. In addition to providing very intimate control of lighting between raids, the system would be of inestimable value as an integral part of the general A.R.P. scheme. It would be capable of doing many things, and the following can be regarded as a very general outline. Many, if not any, other operations can be provided for:

Street lamps out.
Operate warning sirens.
Street wardens out.
Fire wardens out.
Call fire brigades.
Call ambulances.
Decontamination squads.
Sound "All-Clear" sirens.
Street lamps on.

The calling out of street and fire wardens is likely to prove rather a difficult problem but, under the scheme envisaged, the matter would be very simple.

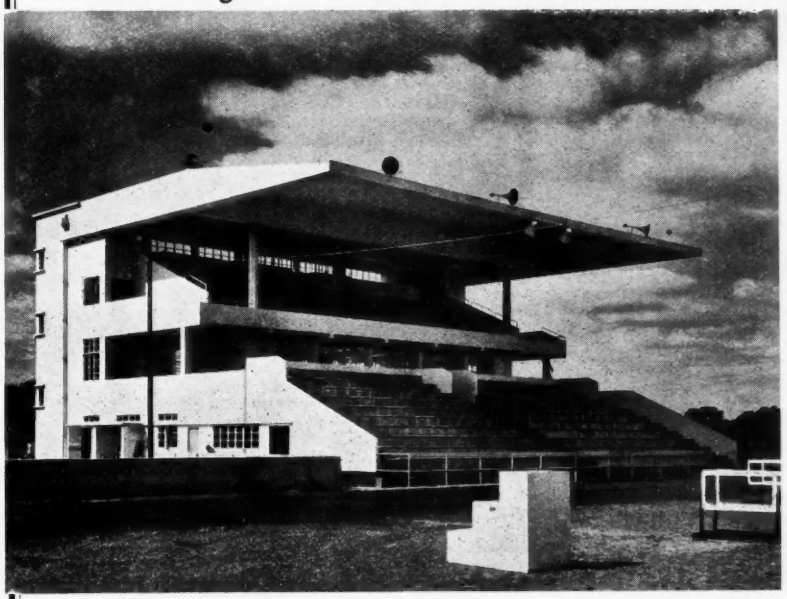
Another important use to which the control system could be put is for training purposes. At certain unspecified times these wardens, &c., could be brought out, without previous warning, and be put into training under conditions which would closely resemble the real thing—in my opinion a great aid to proficiency in this section of Home Defence, especially if the "calling-out" were made periodic. One of the rather obvious weaknesses of our A.R.P. system is that, with the lapse of time, there is a lack of continuity of training. This is probably inevitable. I mean that personnel are trained in, say, decontamination and, when trained, are, as it were, written off. There is an immense value in periodic fresheners, and this can be done with the minimum of organization and the maximum of efficiency with a suitable control system.

I close my Paper by replying beforehand to a criticism which is fairly certain to be made.

I realize that the Home Office Circular referred to is not completely definite on this question of continuous darkening, and that some of my points might be covered by the permissive clause at the end of the paragraph. It is, however, generally considered that the official mind is convinced of the need of rigorous lighting restrictions and the problematic relaxation thereof might mean anything or nothing. Yet this relaxation, at the least, must mean control of some sort and, equally, must mean approved control. This, apart from the description of the Leicester experiment, is the main point of my Paper, emphasizing the fact that control is necessary for the initial darkening.

I would, therefore, and at the risk of repetition, ask the Home Office seriously to re-examine and reconsider this question of control, and to bear in mind the great additional advantages to be derived from automatic control, the training of A.R.P. personnel, the calling out of wardens, &c., in an emergency, and also the normal peace time financial savings and the increase in efficiency of lighting installation.

How Gas Serves a Modern Sports Pavilion



Gas is being used to an increasing extent for the provision of hot water for sports pavilions, where the service demanded is often of a somewhat special nature, and owing to its flexibility of action, it has proved itself easily the best fuel to cope with such situations.

At the new Grand Stand of the Regent Street Polytechnic at the Chiswick Stadium, "REX" and "EMPEROR" Automatic Gas Fired Heaters have been installed to supply the showers, hand basins, and a bathing pool, of which a descriptive leaflet will be sent on request.

The Grand Stand of the Regent Street Polytechnic Stadium
(*Joseph Addison, F.R.I.B.A., Architect.*)

THOMAS POTTERTON (HEATING ENGINEERS) LTD.
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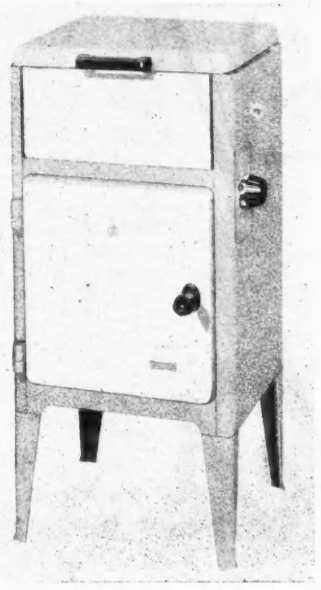
THE many friends of Mr. Ernest Smith, Chairman of Smith's Meters Limited, will learn with regret of his passing on August 18th last, at the age of 59 years.

The family tender their grateful thanks to all those who sent messages of condolence and floral tributes.

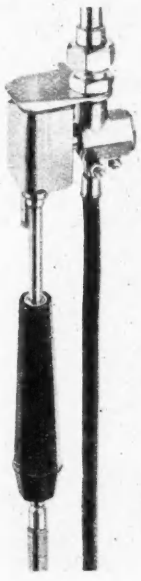
Trade Notes

A New Parkinson Cooker.

Neat simple lines and maximum convenience have been combined in the Parkinson "Crown" cooker. The smooth exterior completely covers all supply pipes; the white porcelain enamel oven door has no crevices to clean, and the white enamelled cover can be closed down over the hotplate. Other features include new design top bars, finished in black vitreous enamel, and the "Adjusto" oven heat control, recessed in the side of the cooker. An innovation of practical utility is available in the form of detachable side turrets for a small extra charge, thus providing useful additional space for cooking utensils. These turrets are supplied in grey mottled enamel finish to match the sides of the cooker.



The "Crown" cooker is available in two sizes, the respective oven dimensions being 14⅝ in. by 14 in. by 12⅝ in., and 18⅛ in. by 16⅛ in. by 13 in. The "Crown" A Hotplate consists of one boiling burner and a combined griller and boiling burner, while the B model consists of two boiling burners and one combined griller and boiling burner. The modern design of the "Crown" cooker taps makes them particularly attractive in appearance, while a feature of value to the housewife is the instant simmering position to the hotplate taps. A safety locking device in the oven tap renders accidental turning on of the gas impossible. The smooth lines of the enamelled oven interior, entirely without projections or rough edges, make the oven extremely simple to clean. When the easily removable "Clenbar" gates and grids are taken out they may be cleaned with a damp cloth. The grids are so designed that plates may be warmed in the oven by the residual heat.



The "Crown" forms a very smart addition to the kitchen and enables the Gas Industry to offer a complete range of "Cabinet" type cookers pioneered by the Parkinson Company.

A New Gas Lighter.

The new gas lighter recently introduced by the Parkinson Stove Company, Ltd. for attachment to gas cookers is a neat and dependable apparatus and a great saver of matches. The operation of the lighter is simplicity itself. All that is necessary is to lift the lighter handle into a horizontal position and pull it towards you. This operation combines to turn on the gas and produce the spark from the flint mechanism. The replacement of the lighter head in the socket enables the lighter handle to drop by gravity into its vertical position, thereby turning off the gas. A spare flint is carried in the apparatus.

G.K.B. Air Raid Shelters.

Trenches are the best protection against high-explosive bombs, states a recently issued book on A.R.P. by the Guest Keen Baldwins Iron and Steel Company, Ltd., who claim that G.K.B. steel arches and sheeting form the cheapest and strongest method of reveting trenches. G.K.B. arching placed in a trench 4 ft. deep and covered with 2 ft. 9 in. of earth, it is stated, is a complete protection from H.E. blast and splinters, falling debris, or collapsing buildings. Shallower trenches can be employed where water is encountered near the surface; deeper trenches, flush with the ground, can be made, and the G.K.B. arching is claimed to be strong enough to allow heavy lorries to be driven overhead. Steel arches and sheeting, states the booklet, are more permanent than wood and cheaper than concrete. No shuttering is necessary, and erection is quick. Furthermore, it is stated that both arches and sheets have a high recovery value. The materials for all sizes of shelter are obtainable from the firm and many diagrams and illustrations of shelters are given in this interesting publication.

Foster & Pullen, Ltd.

Messrs. Foster & Pullen, Ltd., announce that they have increased their representation by the appointment of Mr. J. W. Lintott to cover the southern area of England. The object of this appointment is to give their friends in that area the full benefit of the "Avil" service in connexion with public lighting schemes.

Light Cars for Fitters.

After an experimental period with Lloyd "350" two-seater light cars (manufactured by Lloyds Cars, Ltd.), the Gas Light and Coke Company Transport Department has ordered a fleet of eight for use by its staff of fitters. In a degree the standard design is departed from, to allow the carriage of gas meters in place of a passenger, and a full kit of fitter's tools is carried in racks under the bonnet. The Gas Light and Coke Company has, we understand, been impressed by the economical performance of these 50-miles-an-hour, 50-miles-to-the-gallon runabouts, with their single-cylinder water-cooled engines of 350 c.c. (tax £4 10s. per annum) mounted at the rear. In addition to orders for the home market, Lloyd Cars, Ltd., have orders in hand for the Dominions.

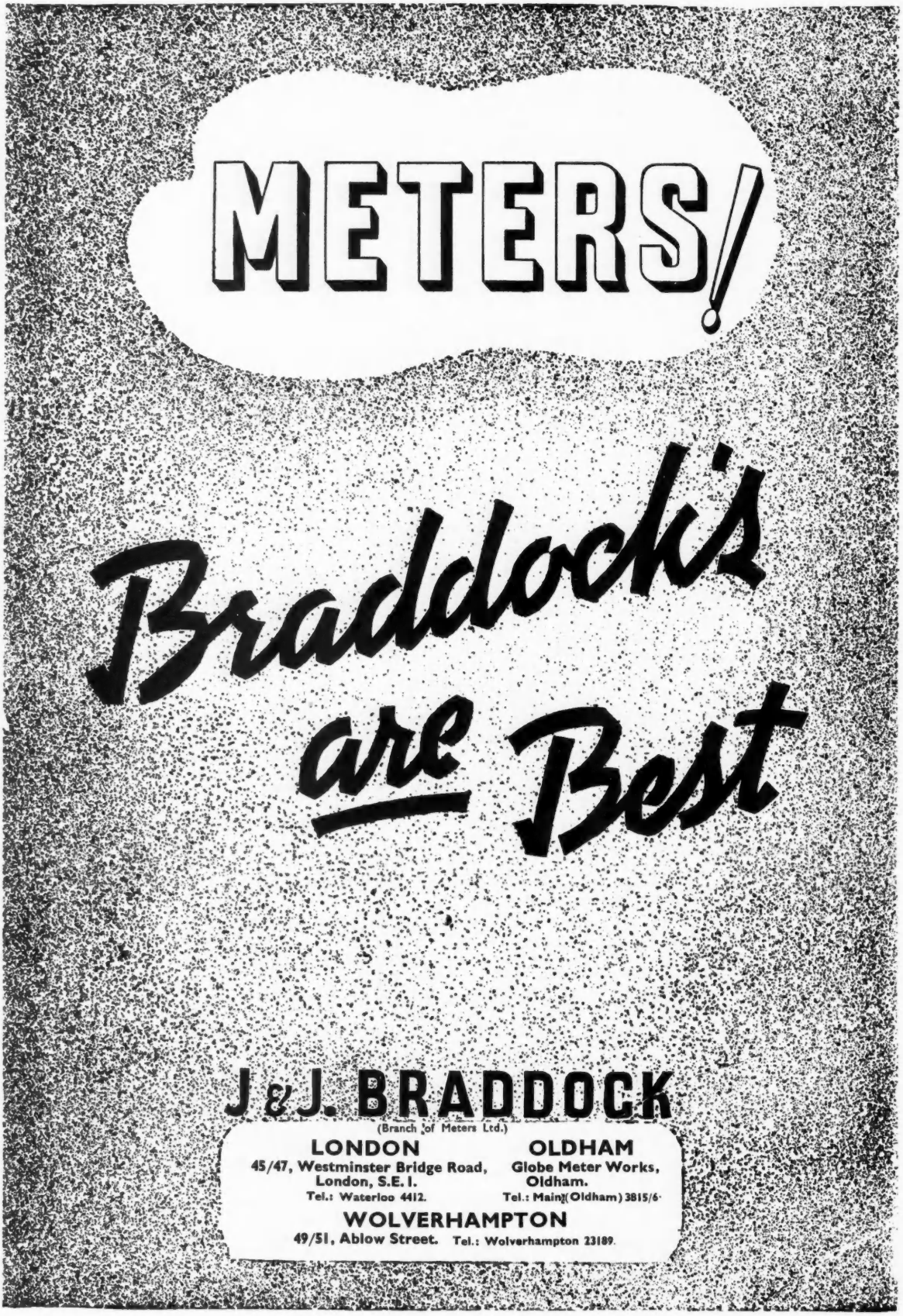
A New House Organ.

The *Blenheim Bulletin* is the title of a new house organ just launched by William Edgar & Son, Ltd. This is a bright little journal which the firm propose to circularize throughout the Industry with a view to acquainting their friends with their activities. The year has been a turning point in the history of Edgars—for after many years at the old Blenheim Works they have now established themselves in new headquarters where the manufacture of their well-known products is proceeding under excellent conditions. The new publication gives interesting details of the firm's plug-in fittings, cocks, connexions, and gas pokers. Some illustrations are included of the new works at Hammersmith, while a section is devoted to the social side. We would join with the Editor of the *Blenheim Bulletin* in expressing the hope that the record of their progress in the pages of this new house organ may not only carry with it the goodwill and confidence of their old friends but gain the interest and support of new ones.

A Carnival Display from Barnstaple

ALL OVER
ASCO
ASCOT GAS WATER HEATERS GIVE CONSTANT HOT WATER ANY HOUR DAY & NIGHT
FOR FULL PARTICULARS APPLY
BARNSTAPLE GAS Co
ASCOT

This striking hot water display was entered by the Barnstaple Gas Company in the recent Braunton Carnival, securing second prize.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Markets and Manufactures

Current Sales of Gas Products

The London Market

LONDON, *Sept.* 5.

There is little change to record in the prices of tar products in the London market, which remain as follows:

Pitch nominal at about 33s. per ton f.o.b.
Creosote, about 4¾d.
Refined tar, 3¾d.
Pure toluole, 2s. 2d. to 2s. 3d.
Pure benzole about 1s. 9d.
95/160 solvent naphtha, 1s. 7d.
90/160 pyridine about 10s.
All per gallon naked at makers' works.

The Provinces

Sept. 5.

Crude Gas-Works Tar, 15s. to 20s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 31s. to 32s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 32s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 4¾d.; low gravity, 4¼d. to 4¼d. Carbolic acid, 60's, 1s. 9d. to 2s. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4¼d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable. Heavy oil: Unfiltered heavy tar oil, min. gr. 1,080, 4¼d. to 4⅞d.; filtered heavy tar oil, min. gr. 1,080, 5¼d. to 5¾d.; heavy tar oil, gr. less than 1 080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Sept.* 3.

Market remains dull with quotations unstable. Enquiries are, if anything, more numerous.

Crude gas-works tar.—Actual value is about 37s. to 38s. per ton *ex* works in bulk.

Pitch remains very quiet despite the approach of the shipping season and supplies are available at about 25s. per ton f.o.b. for export and 23s. per ton *ex* works in bulk for home trade.

Refined tar is becoming less active, but quotations are unchanged at 3¾d. to 4d. per gallon in the home market and 3d. to 3¼d. per gallon in buyers' packages at makers' works for export.

Creosote oil.—New business is confined to comparatively small orders and the following prices are approximate: Specification oil, 4¾d. to 5d. per gallon; low gravity, 5¼d. to 5¾d. per gallon; neutral oil, 5d. to 5¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—Competition is extremely keen and quotations are as under: Pale, 97/99%, 1s. 5d. to 1s. 7d. per gallon; dark, 97/99%, 1s. 3d. to 1s. 5d. per gallon; and pale, 99/100%, 1s. 8d. to 1s. 11d. per gallon; all according to quality, *ex* works in buyers' packages.

Crude naphtha.—Available supplies command 5¼d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 4d. to 1s. 4¼d. per gallon, and 90/190 heavy naphtha is 1s. 1d. to 1s. 1¼d. per gallon.

Motor benzole remains at 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. 6d. to 9s. per gallon and 90/140 grade is 9s. 6d. to 10s. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole..	0 9½	to	0 10	per gall. at works
Motor „ ..	1 3	„	1 3½	„ „ „
90% „ ..	1 4	„	1 4½	„ „ „
Pure „ ..	1 8	„	1 8½	„ „ „

Dividend Announcement

South-Western Gas and Water Corporation, Ltd.—Close Brothers, Ltd., Secretaries, announce that the Directors of the South-Western Gas and Water Corporation, Ltd., have declared an interim dividend on the ordinary shares of 2% actual, less income-tax, payable on Oct. 12, 1938, warrants to be issued on Oct. 11.

Guildford Capital Issue

Notice is given by the Directors of the Guildford Gas Light and Coke Company of their intention to offer for sale by tender £36,866 4% redeemable preference stock, 1963-68, at a minimum price of issue of £100 per £100 stock or such an amount as with premiums will realize a sum of £36,866. Further particulars will be found in our advertisement columns.

Australian Gas Light Issue

The Directors of the Australian Gas Light Company are offering for sale by auction 35,000 "A" shares of £6 each. The shares will be offered for sale in lots of not more than sixteen.

PROTECT WITH

METROTECT

a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

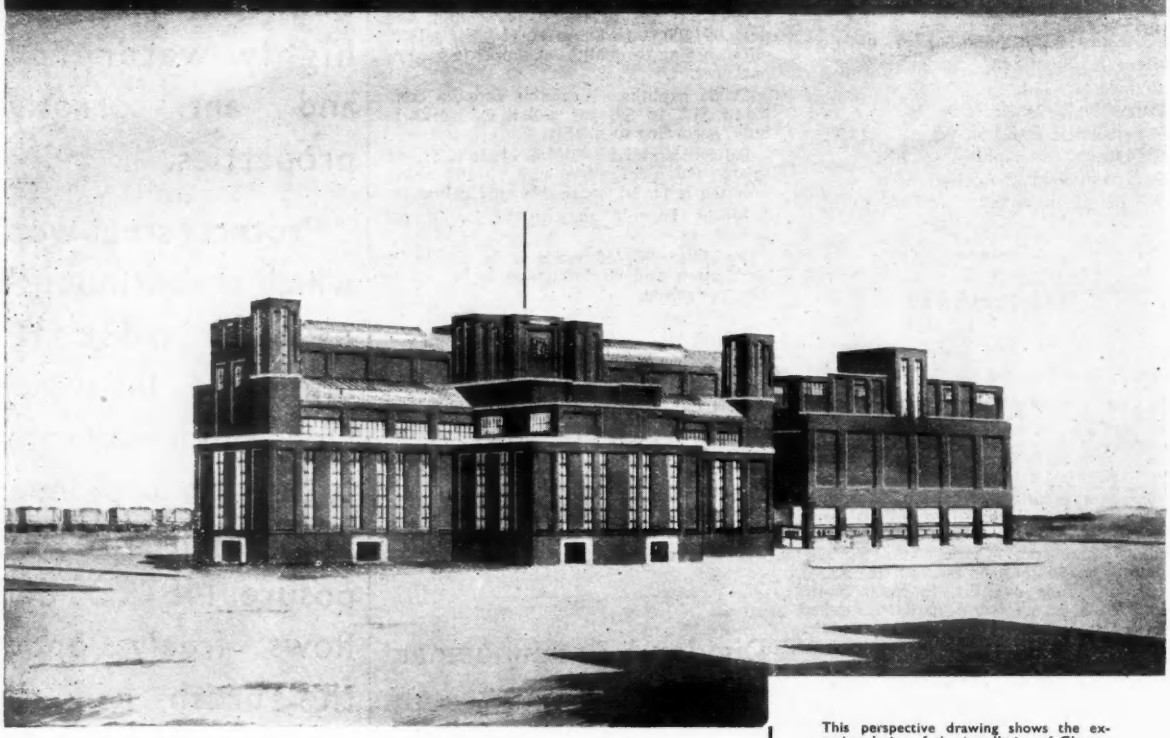
Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.

NEW

Glover-West PLANT FOR BLACKPOOL



This perspective drawing shows the exterior design of the installation of Glover-West continuous vertical retorts ordered by the BLACKPOOL Gas Department for the new Corporation Gas Works to be established at Marton, as it will appear when completed. Interesting and important new features will make this 72-retort plant, with its extensive coal and coke handling and waste-heat recovery equipment, an outstanding example of modern advances in carbonizing practice.

A carbonizing plant which will be one of the most complete and economical in operation so far erected in this country.

Dignity allied with utility in architectural treatment will be a striking external feature of Blackpool's new Glover-West installation. It will also embody the many advantages and amenities upon which the world-wide prestige of the Glover-West system has been built during 30 years of constant research and development for the advancement of gas production methods.

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING
'Phone: COLLYHURST 2961 : 'Grams: "STOKER, MANCHESTER"

LONDON: COLUMBIA HOUSE, ALDWYCH, W.C.2
'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

GAS STOCKS AND SHARES

Developments in the European situation over the week-end led to further uneasiness on the Stock Exchange at the opening last week and prices in practically all sections were marked down. Even British Government stocks, which had previously been little affected by events abroad, suffered a relapse, though this was partly attributable to selling by nervous holders and the subsequent absence of buying. As each day progressed there was not sufficient improvement in the general outlook to induce much increase in business. Home rails had another disappointing setback by reason of the latest unsatisfactory traffic returns. Industrials were patchy, though some recovery was noticeable in oils and gold mining shares.

The Gas market fell into line with other departments as regards the small volume of business, though it will have been noticed that during the past few weeks, while prices elsewhere have been steadily losing ground, gas stocks generally had not suffered to any great extent. Unfortunately Gas Light units and Imperial Continental have been two notable exceptions, and the former lost a further 9d. last week to 22s. 9d. It must be admitted that gas "ordinaries" have depreciated since a year ago, and a list showing the extent of the losses was published in the "JOURNAL" of July 6, though since then with few exceptions values have not altered to any extent. In common, however, with gilt-edged securities, which now stand 2 or 3 points higher than a year ago, gas debenture stock are now quoted at almost the same figure as at that date and are now showing a tendency to harden.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 2.	Rise or Fall on Week.
1,767,439	Mar. 7	8	8	Alliance & Dublin Ord. ...	145—155	...
374,000	June 20	4	4	Do. 4 p.c. Deb. ...	93—108	...
734,733	May 9	5	5	Asscd. Gas & Water U'd'ts Ord.	17/6—19/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-	...
444,389	,,	§-/4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/-	...
296,523	,,	4	4	Do 4 p.c. Irred. Cum. Pref.	16/—18/-	...
500,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
558,890	Aug. 22	7	7	Barnet Ord. 7 p.c.	157—162*	...
300,000	Apl 4	1/4§	1/9§	Bombay, Ltd.	24/6—26/6	...
179,915	Aug. 22	9½	9½	Bournemouth slidirg scale ...	195—205*	...
590,407	,,	7	7	Do. 7 p.c. max. ...	157—162*	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	133—139*	...
50,000	June 20	3	3	Do. 3 p.c. Deb. ...	78—83	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Aug. 8	7½	7½	Brighton, &c., 6 p.c. Con. ...	142—147	...
649,955	,,	6½	6½	Do. 5 p.c. Con. ...	126—131	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	125—130	...
855,000	Mar. 7	7	8	British Ord.	138—143	...
100,000	June 3	7	7	Do. 7 p.c. Pref	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	June 20	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	July 18	6	6	Cardiff Con. Ord.	118—123	...
237,860	June 3	5	5	Do. 5 p.c. Red. Deb.	105—110	...
98,936	Mar. 21	2/-	2/-	Colombo Ord....	1½—1¾	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.... ...	23/—25/-	...
739,453	Mar. 21	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/-	...
1,775,005	Aug. 8	5	5	Commercial Ord.	79—84	...
140,000	,,	—	§13/4	Do. 4 p c Red. Pref.	97—100	...
620,000	June 3	3	3	Do. 3 p.c. Deb. ...	72—77	...
286,344	Aug. 22	5	5	Do. 5 p.c. Deb. ...	113—118*	...
200,000	,,	—	§30/2	Do. 3¾ p.c Red. Deb.	99—102*	...
807,560	Aug. 8	7	7	Croydon sliding scale ...	135—140	...
644,590	,,	5	5	Do. max. div. ...	105—110	...
620,385	June 20	5	5	Do. 5 p.c. Deb. ...	115—120	...
239,000	Aug. 8	5	5	East Hull Ord. 5 p.c. ...	94—99	...
185,355	Aug. 8	6	6	East Surrey Ord. 5 p.c. ...	116—121	...
176,211	June 3	5	5	Do 5 p.c. Deb. ...	115—120	...
250,000	July 4	4	8	Gas Consolidation Ord. 'B'...	20/—21/-	...
250,000	May 9	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
19,223,324	Aug. 8	5½	5½	Gas Light & Coke Ord. ...	22 3—23 3*a*	—/9
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	79—82	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref....	99—102	...
2,993,000	July 4	—	3½	Do. 3½ p.c. Red. Pref. ...	100—103	...
8,602,497	May 23	3	3	Do. 3 p.c. Con. Deb....	81—84	—½
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb....	112—115	+1
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb....	110—113	+1
700,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb....	97½—100½	...
270,466	Aug. 22	6	6	Harrogate New Cons. ...	117—122*	...
157,500	Mar. 21	1/2½	‡1/-	Hong Kong and China Ord. ...	½—1	...
213,200	Aug. 8	6	5½	Hornsey Con. 3½ p.c. ...	100—105	...
5,600,000	May 9	8	12	Imperial Continental Cap ...	113—118	—1
223,130	July 18	3½	3½	Do. 3½ p.c. Red. Deb....	87—92	...
285,242	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	164—169	...
11,751	Aug. 22	10	8	Maidstone 5 p.c. Cap. ...	175—185*	...
63,480	June 20	3	3	Do. 3 p.c. Deb.... ...	70—75	...
75,000	May 23	†10	†10	Malta & Mediterranean ...	135—140	—2
				Metropolitan (of Melbourne) ...		...
392,000	Apl. 1	5½	5½	5½ p.c Red. Deb.	99—102	...
231,977	Aug. 22	5	5	M.S. Utility 'C' Cons. ...	99—104*	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100*	...
360,075	June 20	4	4	M.S. Utility 4 p.c. Deb. ...	97—102	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
675,000	May 9	†6	†6	Montevideo, Ltd.	73—78	...
250,000	Aug. 8	7½	7½	North Middlesex 6 p.c. Con.	142—147	...
396,160	Aug. 8	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Apl. 25	†9	†7	Oriental, Ltd.	147—152	...
468,537	June 3	8	8	Plymouth & Stonehouse 5 p.c.	150—155	...
621,667	Aug. 8	8½	8½	Portsmouth & Gosport Cons.	157—162	...
241,446	,,	5	5	Do. 5 p.c. max. ...	100—105	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	94—99	...
114,000	Aug. 8	5	5	Preston 5 p.c. Pref.	104—109	...
247,966	June 3	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	July 18	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Mar. 21	6	6	San Paulo 6 p.c. Cum. Pref. ...	8¾—9¼	...
441,275	Apl. 25	1/1¼	1/1¼	Severn Val. Gas Cor. Ld. Ord.	21/—23/-	...
460,810	Mar. 21	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Aug. 22	5	8½	Shrewsbury 5 p.c. Ord. ...	127—132*	...
9,000	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	Aug. 22	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	22/—24/-*	...
871,636	,,	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-*	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/-*	...
450,000	Aug. 8	4	4	Do. 4 p.c. Deb.	99—102	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—97	...
6,709,895	Aug 8	6	5	South Met. Ord.	105—108	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	128—133	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	95—100	...
1,895,445	June 20	3	3	Do. 3 p.c. Deb.	77½—80½	...
1,000,000	July 4	5	5	Do. 5 p.c. Red. Deb. ...	109—112	...
600,000	,,	—	§31/-	Do. 3¾ p.c. Red. Deb. ...	99—102	...
1,543,795	Aug. 8	6	6	South Suburban Ord. 5 p.c. ...	116—121	...
512,825	,,	5	5	Do. 5 p.c. Pref.... ...	108—113	...
500,000	,,	4	4	Do. 4 p.c. Pref.... ...	95—100	+1
250,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	97—100	...
888,587	June 3	5	5	Do. 5 p.c. Deb.	115—120	...
250,000	,,	4	4	Do. 4 p.c. Deb.... ...	96—101	...
200,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
427,859	Apl. 25	1/2½	9½	S. Western Gas & Water Ord.	15/6—17/6	...
160,523	,,	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pf.	19/—21/-	...
110,000	June 3	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
750,541	Aug. 8	5½	5	Southampton Ord. 5 p.c. ...	106—111	...
148,836	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
350,000	Aug. 8	5½	5½	Swansea 5½ p.c. Red. Pref. ...	106—111	...
94,000	June 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
1,076,490	Aug. 8	6½	6½	Tottenham and District Ord.	125—130	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref. ...	117—122	...
62,235	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...
371,850	June 3	4	4	Do. 4 p.c. Deb. ...	96—101	...
85,701	Apl. 25	6	6	Tuscan 6 p.c. Red. Deb. ...	95—101	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	18/6—20/6*	...
1,051,280	May 9	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/6—21/6	...
762,241	,,	-/1·15	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/-	...
745,263	June 3	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/—18/-	...
1,000,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
373,939	Aug. 8	7	7	Uxbridge, &c., 5 p.c.	132—137	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Aug. 8	7	7	Wandsworth Consolidated ...	135—140	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	96—100	...
1,343,964	June 3	5	5	Do. 5 p.c. Deb. ...	115—120	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
400,000	,,	—	§25/-	Do. 3½ p.c. Red Deb.	97—102	...
558,342	Aug. 8	7	6¾	Watford and St. Albans Ord.	133—138	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	118—123	...
200,000	June 3	4	4	Do. 4 p.c. Red. Deb.	96—101	...
100,000	,,	3½	3½	Do. 3½ p.c. Red Deb.	94—99	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Sept. 2.	Rise or Fall on Week.
202,152	Mar. 21	5	5	Ascot Ord.	103—108	...
128,182	July 18	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Aug. 22	-/4⅜	-/4⅜	Associated Utilities 4 p.c. Pref.	16/—18/-*	...
100,000	Dec. 13	...	3⅛	Do. 3⅛ p.c. Red. Deb. ...	95—100	...
17,000	Aug. 22	8	8	Bognor Orig. Ord. 'A' ...	155—165*	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165*	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	150—160*	...
37,440	Aug. 8	10	10	Cam. Univ. & Town 10 p.c. max.	155—158	...
125,970	,,	7	7	Do. 7 p.c. max.	133—138	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	July 18	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Aug. 8	4	4	Croydon 4 p.c. Pref.	97—100	...
130,000	June 20	4	4	Do. 4 p.c. Deb.	97—102	...
65,000	Aug. 8	8½	7½	Eastbourne 'A' 5 p.c. ...	140—145	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	115—120	...
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	...
130,000	June 20	5	5	Do. 5 p.c. Deb.	112—117	...
24,000	Aug. 8	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	June 3	5½	5½	Do. 5½ p.c. Deb.	121—126	...
152,000	Feb. 21	8	9	Guildford Cons.	167—172	...
54,055	,,	5	5	Do. 5 p.c. Pref.	108—113	...
68,250	June 20	5	5	Do. 5 p.c. Deb.	107—112	...
156,000	Aug. 22	7½	7½	Hampton Court Cons. ...	131—136*	...
80,000	Aug. 8	4	4	Lea Bridge 4 p.c. Pref. ...	94—99	...
60,000	,,	6	6	Do. 6 p.c. Pref.	121—126	...
94,876	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
73,620	Mar. 7	8⅛	8⅛	Luton Cons. 'A'	155—165	...
107,960	Mar. 21	4	5⅛	Mid Kent Ord.	8⅜—9⅜	...
230,940	Aug. 8	10	10	Oxford & District Ord. ...	195—200	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	107—112	...
126,193	May 9	7⅛	7⅛	Peterborough Ord.	135—145	...
64,990	Mar. 7	6⅛	7⅛	Redditch Ord....	120—130	...
166,850	Aug. 8	8	8	Romford Ord....	142—147	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Mar. 21	5	5	Do. 5 p.c. Deb.	111—116	...
25,570	Aug. 8	5⅛	5⅛	Rugby 5⅛ p.c. Pref.	120—125	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	104—109	...
42,750	June 3	5⅛	5⅛	Do. 5⅛ p.c. Deb.	118—123	...
110,950	Aug. 22	8	8	Ryde Ord.	140—150*	...
270,086	Mar 21	7	7	Slough Ord.	128—133	...
21,000	June 20	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	May 9	5⅛	5⅛	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...
28,866	Mar. 7	4⅛	4⅛	Do. 4⅛ p.c Red. Cum Pref.	18/6—20/6	...
117,228	Aug. 8	7	5	Swindon Cons.	102—107	...
60,425	June 3	5	5	Do. 5 p.c. Deb.	112—117	...
64,380	June 3	5	5	Torquay & Paignton 5 p.c Pref.	107—112	...
130,000	Aug. 8	8	5	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	100—105	...
82,000	Aug. 8	6	6	Weymouth Ord.	103—108	...
98,384	Aug 22	6	6	Wolverhampton 6 p.c. Pref. ...	118—123*	...
160,000	June 20	5⅛	5⅛	Do. 5⅛ p.c.Rd.Db.	105—110	...
90,000	June 20	5	5	York 5 p.c. Red. Deb. ...	104—109	...
133,640	July 18	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	118—123	...
120,000	,,	5	5	Do. 5 p.c. Pref.	105—110	...
35,000	June 3	5⅛	5⅛	Do. 5⅛ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 2.	Rise or Fall on Week.
347,756	July 18	6	5	Bath Cons.	118—120	...
1,667,250	July 18	5	5	Bristol, 5 p.c. max.	112—114	...
120,420	June 3	4	4	Do. 1st 4 p.c. Deb. ...	101—103	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103	...
328,750	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Aug. 8	5	5	Newport (Mon). 5 p.c. max....	97—99	...
13,200	Mar. 21	7	8⅛	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...
13,600	,,	5	6	Do. 7 p.c. 'B'	12—12½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	12—12½	...
140,778	Aug. 8	5	5	Weston-super-Mare Cons. ...	108—110	...
64,338	June 20	4	4	Do. 4 p.c. Deb.	100—102	...
33,340	,,	7⅛	7⅛	Do. 7⅛ p.c. Deb.	151—154	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 2.	Rise or Fall on Week.
157,150	Aug. 8	6½	5	Chester 5 p.c. Ord.	107—110	...
92,500	June 20	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 22	6	6	Liverpool 5 p.c. Ord.... ...	121—123*	-1½
245,500	June 20	5	5	Do. 5 p.c. Red. Pref. ...	97—102	...
306,083	July 18	4	4	Do. 4 p.c. Deb.... ...	100—102	...
106,280	Aug. 8	10	10	Preston 'A' 10 p.c.	198—208	...
188,219	,,	7	7	Do. 'B' 7 p.c.	131—141	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 2.	Rise or Fall on Week.
122,577	Aug. 8	8	8	Blyth 5 p.c. Ord.	161—162	...
732,000	Aug. 22	5	5	Hartlepool G. & W. Cn. & New	108⅜—109⅜*	...
2,061,315	Aug. 8	5⅜	5	Newcastle & Gateshead Con.	22/3-23/-a	-/4½
682,856	,,	4	4	Do. 4 p.c. Pref. ...	99—100	...
776,706	June 20	3½	3½	Do. 3½ p.c. Deb. ...	88½—89½	...
277,285	May 9	5	5	Do. 5 p.c. Deb. '43 ...	104—106	...
332,351	Aug. 22	6	6	Sunderland 6 p.c. max. ...	135—136*	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 2.	Rise or Fall on Week.
542,270	Aug. 8	9	6	Derby Con.	133—143	...
55,000	June 3	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	June 20	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 2.	Rise or Fall on Week.
10,000	Aug. 8	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Aug. 22	6½	6½	Sheffield Cons.	139—141*	...
95,000	July 4	4	4	Do. 4 p.c. Deb.	101—103	...

a The quotation is per £1 of Stock. * Ex div.

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